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USSR REPORT TRANSPORTATION

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CIVIL AVIATION

OPERATION OF TRASSA AUTOMATED ATC SYSTEM EXPLAINED

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 6, Jun 86 pp 34-35

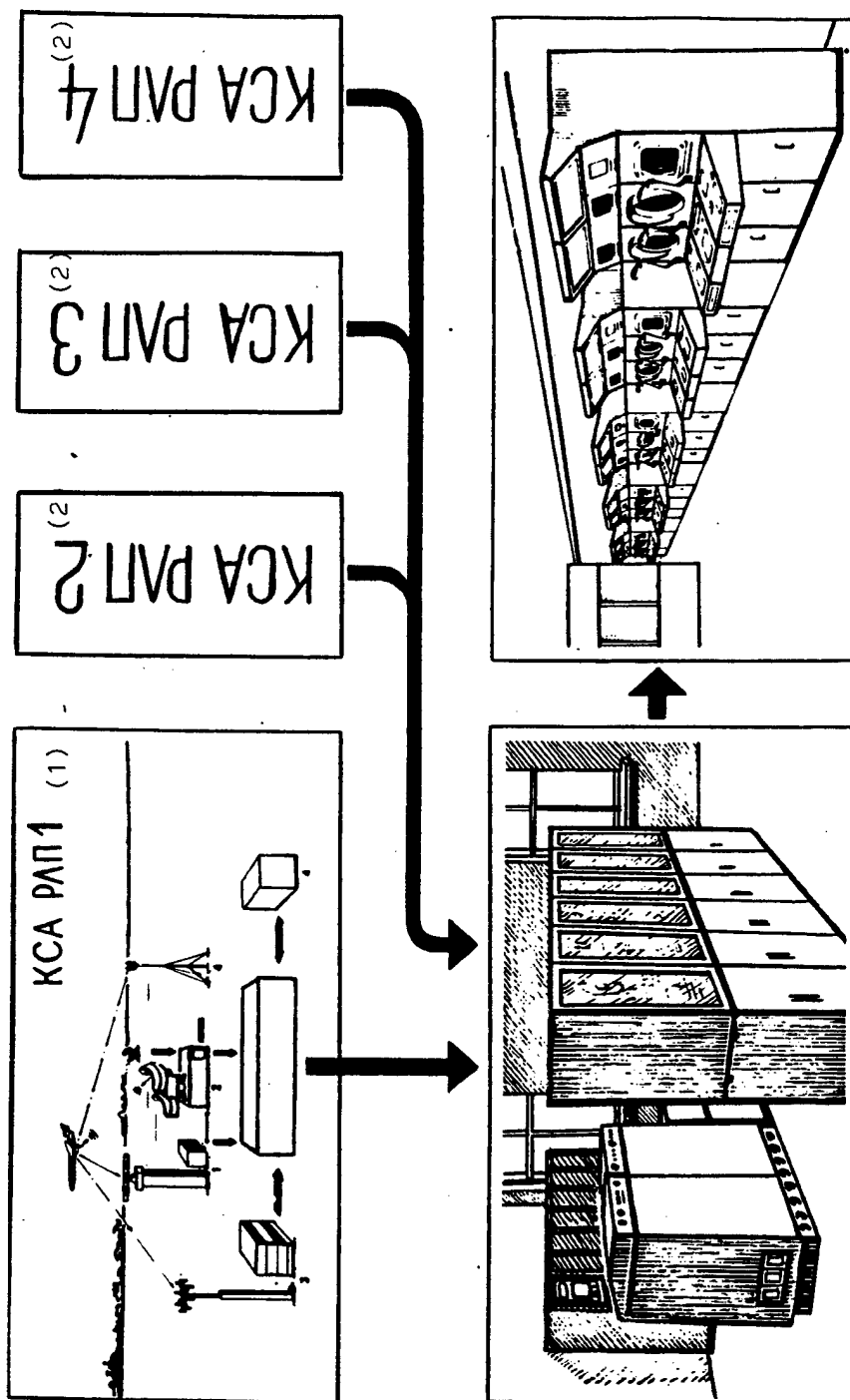
[Article by Ye. Korolev, deputy chief of the Air Traffic Central Administration of the Ministry of Civil Aviation, and V. Mokshanov, chief of a department of the NETs AUVD [Scientific Experimental Center for Civil Aviation ATC Automation] and candidate of technical sciences: "Trassa Plots the Course"]

[Text] The new Trassa automated air traffic control system has been put into service. It was designed for use at regional ATC centers with moderate air traffic. The first Trassa unit was registered in Simferopol.

Trassa was designed for the collection, processing and display of data on the air traffic situation on the screens of the controllers' consoles, as well as for the transmission of this data over ordinary intercity telephone channels and to accommodate the radio traffic between air traffic controllers and aircraft. The system operates with radar and radio communications equipment in combination. At the same time, standard gear in operation at airports and regional centers may be utilized.

As shown in the illustration, the Trassa system is served by primary (2) and secondary (1) radars. A linkup of one local and up to three remote radar stations has been incorporated. Radar information on the air traffic situation in the zone monitored by the regional center comes from them. In addition, data come from the automatic direction finders (3). The system makes possible remote control of the outlying transmitting radio stations and receivers (4) which form the "ground-aircraft-ground" line. Finally, there is a direct telephone link with neighboring regional centers, approach control, and so forth.

So that all the hardware operates efficiently in coordination, the appropriate automation is employed. Trassa incorporates the hardware of the regional center and radar sites (local and outlying). The hardware of the regional center and the local radar site are located in an equipment room, and the hardware of the outlying sites (either fixed or "mobile" versions) is right in the radar stations.



АППАРАТНЫЙ ЗАЛ (3)

ДИСПЕТЧЕРСКИЙ ЗАЛ (4)

- Key: 1. Radar site automated complex No 1: 1--secondary radar; 2--primary radar;
 3--automatic direction finders; 4--outlying radio stations.
2. Radar site complexes Nos 2, 3, and 4.
 3. Equipment room.
 4. Control room.

The radar sites' automated complexes (KSA RLP in the illustration) receive data from the primary and secondary radars and the direction finders. Switching equipment is utilized for this. The analog data obtained are transmitted to the initial processing unit, where the data are translated into digital form. The radar and direction finding data from the radar sites, processed in digital form, come by telephone channels to the regional center's automation complex. The data may be transmitted simultaneously to two other users (the automated ATC systems of neighboring regional centers, for example).

Data are provided in analog form from the local radar site.

Data coming in to the regional center are processed by a computer complex. It was built according to the modular principle--each module (essentially a separate computer) solves its own specific range of problems. However, they can "cover" each other, so that high reliability of the complex and the entire system as a whole is ensured by the backup and flexible redundancy of the modules. In addition, a functional check of the efficiency of all hardware in the system has been provided for; operating efficiency is reflected on a display panel, and a sound alarm warns of malfunctions.

Data on the air traffic situation which come to the regional center, together with a diagram-map of the region, are depicted on the scopes of the sector controllers' consoles. Each console is designed to be operated by three persons: the radar control supervisor, the procedure controller, and the radar operator. The arrangement of control devices and the availability of two scopes depicting the air traffic situation enable the controllers to perform related functions. Two-color (red and green) and white and black cathode-ray tubes are used for the scopes.

Data depicted on the scope are in the form of symbols, vectors and records. The symbols are letters, digits, and geometric figures. The figures illustrate the nature and source of the data. For example, a circle stands for the aircraft coordinates according to the primary radar, and a cross identifies data of the secondary radar. If a coordinate is accompanied by a record, this is indicated in the first case by a square, and by a diamond in the second case.

Data on aircraft movements are grouped in records. Thus, a complete record of tracking (it appears on the scope of the controller who is controlling a given aircraft, and abbreviated records appear on other controllers' scopes) is in two lines, and consists of the aircraft callsign, the record number, and the current and assigned altitudes.

The boundaries of the center and sectors, airways, flight courses, bearings, and so forth are depicted on the scope by vectors (lines).

Three operating conditions are possible for the scope: synthetic, analog-digital, and television. Selection of the first two is determined by the input of data in the computer, and television is provided by switching to a special television unit. In the synthetic condition, cartographic data, lines of bearing, vector measurement, courses, and records of courses are depicted

in red on the color scope. All other data are lighted up in green. In the analog-digital condition, analog data are given in green, and everything else appears in red.

Keyboards for entering data, coordinate code sensors, units for remote control of radio stations, concentrators for intercity communications channels, and other switching components are positioned on the controllers' consoles to operate the Trassa system. Telephones and loudspeakers are available for the controllers.

Operation of the Trassa automated ATC system has confirmed that it enables us to successfully resolve the problems of automated collection, processing, relaying and display of radar and direction finding data obtained from local and remote radar stations and to control air traffic efficiently on the basis of these data. Utilization of the system is enhancing the reliability of flight monitoring in the airspace of the regional ATC center, and is increasing the labor productivity of controllers with a simultaneous reduction in their workload and improvement of their working conditions, and as a result, flight safety is increased.

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CIVIL AVIATION

IMPROVEMENTS UNDER WAY AT ARMENIA'S SISIAN AIRPORT

Yerevan KOMMUNIST in Russian 27 Jun 86 p 4

[Article by E. Sakhonov: "A New Air Terminal: We Report the Details"]

[Text] The air terminal under construction in Sisianskiy Rayon is located on the flat surface of a small mountain valley. Soon the endless waits by passengers for flights in the An-2 workhorse of the sky, which used to make up to 24 flights a day, will become a thing of the past!

The new airport is designed to accommodate the modern Yak-40 airliners. Flight scheduling will be ideal, promise the specialists, since this region has excellent conditions: summer weather for 300 days in the year.

The new terminal smells of plaster and shines with freshness, and its marble floors sparkle. It is fully equipped with a first aid station, a room for mothers and children, and a hotel to accommodate 20 people. Waiting rooms are on the second floors.

A snack bar, barber shop and souvenir shop will open and intercity telephone service will begin operating in the near future--in a word, everything necessary for the care and comfort of passengers.

"The acceptance commission has given the construction and installation and finishing operations an 'excellent' evaluation," says L. Sarkisyan, chief of the SU [construction organization] Armgidroenergostroy (the organization which built the terminal). "We built it in 2 years, performing operations valued at 2.085 million rubles. The entire rayon provided considerable assistance during the construction..."

They have been waiting eagerly for the air terminal in Sisian. It takes 4 or 5 hours in a motor vehicle on a rough road to reach the mountainous rayon, 220 kilometers from the republic capital. Yak's [Yak-40 aircraft] will fly passengers to Yerevan in 15 minutes. Gayk Markaryan, chief of the new airport, explains:

"The air terminal has the capacity to accommodate 100 passengers an hour. The runway will enable us to handle An-28 aircraft later on as well. A service is being equipped for direct communication with the TsAVS (Central Passenger Ticketing Agency). A weather service is being organized. And while passengers previously had to wait 5 or 6 hours to finally find out if they would be flying or not, this has been eliminated in the new terminal."

Direct flights to Baku, Ashkhabad, Kirovabad and Adler are expected in the future. Such a prospect inspires the collective of the air terminal, which may be called youthful with good reason. It will not be long at all before the Sisian air terminal loudspeakers will announce: "Now boarding for flight..."

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CIVIL AVIATION

TICKETING AGENTS FAULT QUALITY OF SIRENA-2 COMPUTERS

Moscow VOZDUSHNYY TRANSPORT in Russian 8 Jul 86 p 1

["Open Letter" to M. Shkabardnya, minister of instrument making, automation equipment, and control systems, from Aeroflot ticketing agents A. Yakovleva from Sverdlovsk, S. Ostapenko and R. Shivitskaya from Kiev, N. Aynulina and S. Degteva from Moscow, and Z. Shibko and I. Dayneko from Minsk]

[Text] Dear Mikhail Sergeyevich! Undoubtedly you are well aware that automated control systems are now being widely introduced in civil aviation. As an example, the Sirena-2, which became an All-Union system in 1986, makes it possible to completely automate the sale and reservation of airline tickets.

We are convinced of its great potentialities from our own experience. Examples of its rapid operation are well known--sometimes a little more than 20 seconds is required to issue a ticket to a passenger from the time that he appears at the ticket window. We want to emphasize particularly the great delight that such operation gives to the passengers. Unquestionably, measures such as these also have an educational and propagandistic impetus, so important now in the period of critical struggle to introduce intensive technologies.

But unfortunately, such operation cannot be guaranteed for every airline passenger yet with the help of the Sirena-2. The frequent malfunctions which arise in the video terminal unit are the cause here. It is being supplied to civil aviation by the "Terminal" Production Association in Vinnitsa and the ticket printer is made by the Orlov Production Association (the Plant imeni Rudnev).

The reliability indicators of this unit are 10 times lower than those indicated in the certificate. The operating time of the video terminal system until one failure amounts to 504 hours, but the certificate guaranteed another figure--5,000 hours. At the same time, more than half of the total number of breakdowns here involve the keyboard, but after all, it is not as if it were such a complicated item compared with the modern electronic complexes which the enterprises of your ministry also are turning out.

The reliability of the ticket printer being produced by the Orlov Production Association is poor as well. The operating time here until one failure

amounts to 370 hours, while the certificate data indicate 2,500 hours. Moreover, the ticket forms are snagged during printing and are cut off unevenly. And the ticket printer mounted on the ticketing agent's desk is also very heavy--30 kilograms. This complicates our work when paper is being loaded and a ribbon is being installed. Experience has shown that one of the most unreliable components of the ticket printer is the printing head. Nearly half of the breakdowns occur because its elements are damaged.

All these especially technical causes result in the Sirena-2 not operating with the productivity that it could. The passengers also are losing confidence in it, when the system "rises" before their eyes, as they say, for a long time.

We ask that you establish your own personal supervision over the production of video terminal units at the "Terminal" Production Association in Vinnitsa and the ticket printers at the Orlov Production Association (the Plant imeni Rudnev). We emphasize that the poor reliability of this equipment results in many, many hours which the airline passenger is forced to stand in line. It is time to correct a situation such as this!

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CIVIL AVIATION

PROGRESS, PROBLEMS IN AUTOMATING AEROFLOT OPERATIONS

Moscow VOZDUSHNYY TRANSPORT in Russian 8 Jul 86 p 3

[Article by V. Galkin, chief of the ASU [Automated Control Systems] Department of the Ministry of Civil Aviation and candidate of economic sciences, under the rubric "The Computerized Information Processing Industry: Progress and Problems": "Not Coping with Electronics in Haste", followed by VOZDUSHNYY TRANSPORT editorial staff note]

[Text] The problems and successes of the computerized information processing industry have been discussed on the pages of VOZDUSHNYY TRANSPORT for several months, as if trying to comprehend the computer technology applied for nearly 25 years in different areas of civil aviation production and management. Both the developers of automated control systems and their customers have taken part in this important discussion. The many statements by our writers are characterized by their businesslike approach, interest and competence. They shared not only experience accumulated in the use of computer technology in different production and management processes, but dwelled on the many unresolved problems which are holding back their efficient use and criticized the shortcomings which exist. The material published below sums up the urgent problems in developing our sector's computerized information processing industry.

When does the Aeroflot passenger's trip begin? When he approaches the ticket window, arrives at the airport, or when, seated comfortably on an airliner, he soars up into the sky? However it may be, concern for the passenger is displayed long before he himself makes a decision on a flight, and the automated systems "display" it. They forecast the passenger flows for several years in advance and help to plan enterprises' transport activity. Aircraft are scheduled with the aid of a computer, and the "Sirena" system is making it possible to provide quality service to the passenger rapidly. Special information systems are helping persons arriving at an airport to get their bearings inside the air terminal.

As we see, electronics is playing an important role in improving the quality of passenger service in many stages of passenger flights. Analysis of its

work in the different civil aviation administrations is undertaken every year. And it is providing the opportunity to find out where and why an automated system does not operate at full capacity or, on the other hand, it brings the most benefit.

Let us say that computer equipment has been utilized in the Moscow Transport Administration for nearly 20 years. Today 15 automated control systems are operating there for different purposes, performing more than 300 tasks. For the first time in Aeroflot, an automated system was introduced at Vnukovo and Domodedovo for efficient control of the airports' activity. Its purpose is to put together and adjust daily production plans, handle passenger and freight flows, provide information on flights, and so forth. The complicated tasks of equipment diagnostics also are being solved with the use of a computer ("Analiz-86").

Utilization of computers in this administration yields 2 million rubles in profit, and has a substantial effect on such important indicators as the increase in commercial work, the increase in flight safety, and the reduction of expenditures to operate the fleet of aircraft.

The "Sirena" automated system for ticket sales and reservations, well known to us since 1972, has proved itself well. Today every fourth Aeroflot passenger is being served with its help. The socioeconomic gain is impressive--16.5 million hours of socially useful time annually have been saved.

Alas, however, use of an automated control system does not always yield positive results. Analysis has shown that a system such as the planning of transport activity at the level of territorial administrations of civil aviation (the "Transport" ASU), for example, does not meet the customer's requirements and operates at "truncated" volume. Here is a specific figure for you: the operating volume of systems such as this in the Ukrainian, Turkmen, East Siberian and Urals Administrations amounts to 30-80 percent. The reason for the lack of success: obsolescence of the systems, an insufficiently high level of maintenance for them during the entire life cycle, and the lack of restrictions connected with fuel limitations, as an example.

Another example: the Armenian, West Siberian and Leningrad Administrations have discontinued operating the "Uchet i nadezhnost" [accounting and reliability] subsystem. It proved to be either quite expensive or inconvenient for users.

The results of the discussion in the newspaper on the problems of computerized information processing attest first of all to the fact that efficient use of the latest equipment cannot be ensured by acting hastily toward it. Many-sided, systematic and long-term work is needed, beginning with the customer's understanding of the potentialities of computer use to the completion of a broad combination of preparatory measures and achieving the desired result.

The unpredictability of the electronics which the technical personnel of computer centers are struggling with daily when they come to the permissible limits of a number of parameters--climatic conditions, power supply, and

others--has compelled us to treat everything connected with computer application with more respect. All elements in the complex chain, from entering information to obtaining solutions from processing results, should meet strictly defined requirements as well.

For the present, the computer is still expensive gratification for the customer. On the average, the cost of the complex of technical facilities for the "Sirena-2," for example, comes to about a million rubles, and add on the expenses for planning and developing a computer center, the leasing of communications channels, continuous power supply, allocation of production areas, and many other items. Taking all this into consideration, we are trying to plan the development of an automated control system from the bottom, not from the top: we proceed from a search for shortcomings in the administration of an enterprise and identification of the efficiency factors which offset the expenditures to introduce the system.

So that a computer does not turn into a tribute to fashion or prestige, we have been compelled to establish a procedure for justifying the necessity for developing a system which "will not permit a ruble to be thrown to the wind," as expressed by A. Sharoshin, chief of the UGATs [Central Regions Administration] Computer Center (VOZDUSHNYY TRANSPORT No 155 of 28 December 1985, "Benefit Counts Without Fail").

However, it is evident that not everyone understands the principle according to which computer equipment is allocated. We consider the criticism directed at us by the the dean of the Skills Improvement Department of the Kiev Institute of Civil Aviation Engineers, V. Kulik, to be unjustified. In his article "The Position Remains Unresponsive" (VOZDUSHNYY TRANSPORT No 2, 4 January 1986), he charged us with not foreseeing the necessity of providing educational institutions with computer equipment under centralized order and allocation.

A procedure has been established in the sector for ordering this equipment, in accordance with which each enterprise orders it for its own needs and substantiates its requirement for it. Unfortunately, the demands for a microcomputer are in excess of our resources. It is being allocated primarily to those organizations which demonstrate the maximum benefit from its use in their substantiations. Those enterprises which set about taking part in the technological process of developing an automated control system also are being provided with computer equipment; the Riga Institute of Civil Aviation Engineers proceeded this way, as an example. As far as the Kiev Institute is concerned, it has not assumed commitments such as this.

S. Fomin examined the problem of training for computer competence in the article "Creativity Needs Support" (VOZDUSHNYY TRANSPORT No 4, 9 January 1986). It must be said that we are devoting considerable attention to the matter of personnel training. Only highly skilled specialists can operate the most complex computer equipment, which is being updated continuously, moreover. We have organized centralized training in 138 specialties at 19 scientific instruction centers of the USSR Ministry of Instrument Making,

Automation Equipment, and Control Systems; Ministry of the Radio Industry; and Central Statistical Administration. From 500 to 700 persons from all the sector's enterprises are undergoing retraining every year.

I would like to point out the initiative of the Riga Institute mentioned previously. Training of operations personnel has been begun in the Skills Improvement Department to operate the "Sirena-2," and training will be organized on the basis of the "Iskra-226" in the near future for users at a number of work places.

A. Frayman's "The Complexities of Dialog, or Who Gains from Short Trips" (VOZDUSHNYY TRANSPORT No 156, 31 December 1985) and other authors raise the problems of the obsolescence of automated control systems in the pages of the newspaper.

In fact, this is one of the most important problems for our sector. We are not meeting the demands of enterprises for automated control of their activity to the full extent with the resources available to the developers: the TsNII ASU GA [Central Scientific and Technical Institute of Civil Aviation for Automated Control Systems], the GVTs GA [Main Computer Center of Civil Aviation], and subunits at a number of computer centers. It is necessary to repeat time and again the standard design solutions that have been developed, and tied to the conditions of each enterprise as well.

The situation has become still more acute because such repetitions are numbered in the hundreds when automated work places are set up. Selection of a strategy is necessary: either reorient the organizations named to the obsolescence of automated systems (but then the rates of developing new solutions will be slowed down and there will be no scientific start or attention stressed on what is new), or adopt another alternative--a combined strategy--obsolescence with simultaneous development of new automated control systems.

The rate of work is being slowed down for still another reason: systems designers must conduct automation work on the basis of the standard technology that has been developed for controlling an engineering process or management project. However, the customer does not have such technology, as a rule. And significant expenditure of resources has to be incurred when one system or another is tied to the conditions of each project.

They may ask: what is the solution? The best solution would be to set up a planning department under the TsNII ASU GA. An alternative is to organize a specialized enterprise in the sector which would provide for the production and supply of software to users on an industrial basis.

Because the TsNII ASU GA still does not have an adequate experimental base yet for simulation of complex systems for controlling engineering processes, design solutions are worked out most often on the technical base of the customer, without complete and thorough verification on the simulating complex. Hence the increased time to introduce systems and, what is especially irritating, their lower quality. Such a complex will be developed, but only in 1987-1988.

Difficulties also arise in the issuance of documentation for automated control systems regulated by state standards. The Riga Institute is a scientific research institute, but under certain conditions, the software product relates to industrial engineering production--it turns out that the task of turning out a product such as this is not in line with the functions of a scientific research institute. Again I come to the fact that we need our own planning base.

V. Pustynskiy, in the article "The Pros and Cons of a New System" (VOZDUSHNYY TRANSPORT No 9, 21 January 1986), correctly raised questions about the introduction of automated control systems. Computers often break down, he writes, because they are set up in facilities that have not been adapted. Yes, unfortunately, there are no especially constructed facilities which meet all the requirements for computer operation. The most difficult equipment arrangement situation is in the North Caucasus Administration: computers are dispersed in various places, none of which meet current requirements. The summer pavilions where the computers are set up are not leakproof. This results in dust filtering not only into the facilities themselves, but into the computers as well, increasing the likelihood of failures.

Practically no funds are being allocated for construction of computer centers. There is only one way out: we are forcing persons out of accommodations.

If one becomes familiar with all the materials published under the rubric "The Computerized Information Processing Industry: Progress and Problems," it is obvious that the main thing which concerns the writers is an increase in the efficiency of computer utilization.

An orderly system of planning and accounting of the efficiency indicators for this equipment and standards and methods support for it is functioning in the sector: indicators of the sector are planned in the state plan for economic and social development and are subject to accounting in the plans of enterprises and to statistical accountability.

Beginning in 1986, four computer centers (the Main Computer Center of Civil Aviation and centers for the Ukrainian, Yakutsk and Uzbek Administrations) were shifted to cost accounting. It is planned to shift another 14 centers to this system by the end of the five-year plan. In this way, 70 to 80 percent of the overall volume of the computerized information services in civil aviation will be paid for by the customers themselves. Implementation of the program cited for shifting computer centers to cost accounting will provide the opportunity not only to increase efficiency in utilizing electronic equipment and the interest of the users, but will also compel customers of automated control systems to look at the necessity for operating individual systems more responsibly.

Operations to provide for concentration of computer capacities and integration of automated systems have been scheduled for the current five-year plan. The objective is to reduce expenditures for utilization of computers. Development of automated control systems has been reflected in the special-purpose program for automated control of the production and economic activity of civil aviation for the current 5-year period. But what will the end result be, and

how will this be expressed economically? The decree by our ministry's collegium set the task of increasing passenger turnover by 2 percent by utilizing automated systems and computers.

It is universally recognized today that computer technology is the catalyst for scientific and technical progress. Solution of the program outlined will become a concrete contribution by the automated control system developers and operations personnel to acceleration of the development of civil aviation and realization of the decisions of our party's 27th Congress.

FROM THE EDITORIAL STAFF: Important questions have been raised in the material published on development of the computerized information processing industry. We would like to find out the opinion of the managers of administrations, enterprises and organizations on whom solution of the urgent problems depends.

In publishing the concluding material, the editorial staff does not plan to discontinue this important topic. It intends to continue the discussion in future issues of the newspaper as well. As before, we await new materials from VOZDUSHNYY TRANSPORT readers raising questions on improvement in the utilization of computers and automated control systems.

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MOTOR VEHICLES AND HIGHWAYS

CHIEF DESIGNER ON MOSKVICH-2141 DEVELOPMENT, FEATURES

Moscow ZA RULEM in Russian No 5, May 86 pp 1-3

[Article by A. Sorokin, chief designer at the Moscow Motor Vehicle Works imeni Lenin Komsomol: "A New Generation of the Moskvich"]

[Text] The Motor Vehicle Works imeni Lenin Komsomol (AZLK) has begun to produce a new model -- the Moskvich-2141. It is planned to produce 2,000 vehicles before the end of the year and then to gradually increase their production so that the Moskvich-2141 will completely replace the former model, the 2140, in 1988.

When a vehicle, which represents the development of a design that -- in its turn -- has been produced for nine years, has been on the assembly line for 10 years, everyone understands that not simply another model but a fundamentally new and radically improved model should be supplied to production. However, which one?

In order to make the only true and most beneficial from all points of view decision, it is not only necessary to foresee the development of the automotive industry in our country and abroad, to consider changes in consumer demand, and to evaluate the range of buyers for the new vehicle. It is also necessary to picture accurately both the economic and the technical capabilities of the country, the branch, allied workers and, of course, the plant itself. Pivotal avenues gradually appear from the complex of interconnected decisions, and work on a new model begins. Despite a number of difficulties, the path of the Moskvich-2141 from the technical assignment to the models, which were approved for production, followed the scheme that has been established in all motor vehicle works.

The motives for rejecting the previous obsolete model were clear. Considerations relating to the designing of the new vehicle were based on future types of passenger cars. It was a long-term document that defined the avenues of work in building new passenger car models which was compiled by the Ministry of the Automotive Industry and its main scientific research institute-- NAMI [Scientific Research Institute for Motor Vehicles and Automobile Engines]. It contained a paragraph pertaining to third-group, light-class passenger cars. They occupy an intermediate position between the Volga and Moskvich-2140. If one sums up the average indicators for the vehicles in this group

now being produced with engines having a working volume of 1,600-1,800 cubic centimeters, one receives the following data: power rating of the engine -- 75-90 horsepower, equipped weight -- 925-1,080 kilograms, base -- 2,510 - 2,650 millimeters, wheelspan -- 1,400-1,460 millimeters, length -- 4,230-4,465 millimeters, width -- 1,660-1,710 millimeters, height -- 1,365-1,410 millimeters, maximum speed -- 155-170 kilometers per hour, acceleration time to 100 kilometers per hour -- 11.7-13.0 seconds, fuel expenditure: at 90 kilometers per hour -- 5.3-6.1 liters per 100 kilometers, at 120 kilometers per hour -- 7.3-7.9 liters per 100 kilometers and under urban conditions -- 8.9-9.4 liters per 100 kilometers.

The Ministry of the Automotive Industry entrusted the development of the design for a third-group, light-class car to our plant.

Goals. Why did the objective need for a vehicle in this group arise? As research had shown, the urban population in our country had begun to make two-fold more intra-city trips and 4.3-fold (!) more out-of-town trips during the past 20 years. World statistics provide a similar picture.

Business trips about the city in combination with long tourist trips and visits to garden plots and out-of-town rest areas called for the need for a roomy five-passenger automobile with a spacious trunk and a body rapidly convertible to transport bulky items. The seating capacity of such a vehicle and its dimensions determine its weight and the engine power which can provide the required speed and traction qualities.

World trends in automobile building show that it is the third-group light-class car with a hatchback type body that most fully satisfies the enumerated requirements. Thanks to modern designs (they are more effective in models of this group), such a car is almost not inferior to machines of the second and, at times, the first groups with respect to economy. As a result, so-called family models of the third light-class group have been increasingly used throughout the world since the second half of the Seventies and during the Eighties. Practically all large associations, which produce automobiles, have adjusted to their production and the sales level of these machines has always remained very stable despite the difficulties in supplying fuel.

Capabilities. The resources allotted for reconstructing production, the selected technology, and the preservation of the affiliated enterprise's continuity-- these are, so to speak, external problems which leave their imprint on the formation of the design of a new model. In turn, the requirements of the designers force existing capabilities to be reexamined or new ones found. Sometimes one has occasion to hear the opinion that it is not obligatory to design one's own -- it is better to purchase a license abroad.

Yes, this is one of the practical ways to win time. Our plant had sufficient proposals from foreign firms. We were aware, however, that having purchased a license for a modern vehicle today, we would arrive at tomorrow with yesterday's design. We also had in mind the fact that the currency resources of the branch were not unlimited and that is why we travelled our own path. Nevertheless, we purchased licenses for several assemblies in the new model.

At the same time, our designers received 18 author's certificates on the whole for design innovations.

In the past, radical changes in the 412 and 2140 base models were limited by rigid technologies. The more modern, so-called flexible technology, which was used for the new vehicle, opens up rich opportunities regarding continuous modernization of the car and the mastering of a wide assortment of modifications.

Advanced designs are not born by themselves but in cooperation with the capabilities of many branches: metallurgical, petrochemical, light industry, machine-tool, electronic, aviation, and a number of others. At times, they will not always be able to supply the automotive industry with items of the required quality and in sufficient amounts. It is far from simple to drag them up to the level that is required by us, especially if one takes into account the fact that these branches are managed by different ministries.

Today, the Ufa Automotive Engine Works supplies engines to AZLK. The Moskvich-2141 will be produced with both the UZAM-331 engine (1,480 cubic centimeters and 72 horsepower at 5,500 revolutions per minute) and the VAZ [Volga Motor Vehicle Works]-2106 (1,569 cubic centimeters and 80 horsepower at 5,400 revolutions per minute). The UZAM-331 is a modernized UZAM-412 engine which is equipped with a new cylinder head with a vortex motion of the fuel mixture and has other improvements. Both are intended for AI-93 gasoline.

The Moskvich-2141 with a UZAM-331 engine expends 5.9 liters per 100 kilometers at a speed of 90 kilometers per hour, 8.0 liters per 100 kilometers at a speed of 120 kilometers per hour and 9.9 liters per 100 kilometers under city conditions. Similar indicators for economy are achieved with the VAZ-2106 engine. The maximum speed of the new model is 155 kilometers per hour and the acceleration time to 100 kilometers is 17.8 seconds with the UZAM-331 engine and 15.5 with the VAZ-2106 engine.

Designs. We have dwelt on configurations with a front wheel drive. It permits combining the engine and transmission assembly into a compact unit. As a result, the space within the body is better used, the weight of the automobile is reduced, considerable advantages in configuration are achieved, and stability and handling characteristics are improved. All of these advantages of a front-wheel-drive configuration are widely known and there is no need to dwell on them.

We selected a longitudinal arrangement for the power plant. In this case it was possible to make without difficulty half-axles of the required length (500 millimeters and identical in size. As a result, the constant-velocity universal joints can support rather large drive-wheel steering angles. This fact is especially important for the Moskvich-2141 which has a rather significant wheel base (2,580 millimeters): The turning radius of the outside wheel does not exceed five meters in the track.

Moreover, repairs are easier, the labor-intensiveness of maintenance is less, the accessibility of assemblies is better, and the gear-shift drive, engine mounts and exhaust system attachments are simpler and more lasting. The selected schema simplifies (for the transmission configuration) the making of a four-wheel-drive modification and makes passive safety more effective in the event of a head-on crash.

However, the power plant, which has been brought forward and mounted along the vehicle's longitudinal axis, creates two main inconveniences. First of all, there is the considerable front overhang of the car. In addition, the engine's upper point -- the front part of the valve mechanism cover -- is located so high that the hood in the front part is rather high also. No matter how resourceful the designers were, it was impossible to conceal or eliminate this shortcoming.

That is why an extremely original design for locating the engine and transmission assembly together was adopted for the Moskvich-2141. The engine is placed 60 millimeters to the right of the car's longitudinal axis. In this regard, the primary and secondary shaft of the five-speed two-shaft gear box lie not in the vertical (as in the ZAZ [Zaporozhye Motor Vehicle Works]-968 but almost in the horizontal plane. Due to the hypoid displacement of the rear wheel axis in the axle drive, the gear box's axle drive is located under the right-hand differential neck. In its turn, the engine, which has been displaced to the right, is moved as close as possible to the differential. As a result, they managed to move the highest point of the engine back and down and obtain a beneficial shape for the chassis with respect to aerodynamics and visibility.

The cooling system's radiator was placed to the left of the engine in order to decrease the car's front overhang. The heating and ventilating unit has been installed behind it in the motor compartment (and not in the passenger compartment). Its noise is dampened by the dashboard panel and an insulating covering that has been placed on it.

Thanks to the large space between the butt end of the engine and the dashboard panel combined with the appropriate designing of the body's strengthening, the passenger compartment in the area of the pedals is deformed very slightly during a head-on crash into a stationary obstacle at a speed of 50 kilometers per hour. In this case, the amount of displacement of the steering wheel inside the body is twofold less than that allowed by international standards. Thus, they managed to do without a telescoping element in the steering column.

Such a detailed narration of the configuration of the new car's front portion is unavoidable. It reflects the focus of the contradictory requirements and conditions that are very acute and complicated in front-wheel drive vehicles. It is not complicated to gain an understanding of how the new model was built, having the "living" machine and the manual for it before one's eyes. The logic of designs, especially radically different ones, is often unknown to or little understood by the ordinary motorist. That is why it is more important to size up not only all the "hows" but also the "whys" with one's first acquaintance with the new vehicle.

Some of these "whys" have simple and easy answers. Thus, the gear-box was made a five-speed one; the highest gear is the overdrive. It permits the expenditure of fuel to be reduced when travelling with a light load at high speeds. There are two other distinctive features connected with the transmission: All of the housings are made of an aluminum alloy in order to decrease the weight of the casting and the synchronizing devices are of the pin type for maximum efficiency.

However, there are "whys" whose answers are complicated and logically connected. You see, any improved design is almost always a compromise. For example, we have dwelt on the MacPherson-type front-wheel independent suspension system (it is also called "candle"). Compared to other systems, it is simpler in construction and has less weight and a number of other advantages. With it, in particular, it is very convenient to arrange the parts of the rod steering gear which can be placed in a safe position -- near the dashboard panel. The designing and manufacturing of this suspension, however, requires definite experience and technical capabilities. It is also known that a candle suspension more readily transmits the noise, which arises from the wheels meeting unevenness on the road, to the carrying body. Nevertheless, weighing the pluses and minuses, we decided to use this wheel suspension and found measures to counteract its deficiencies.

In order to accommodate the lower part of the candle suspension's column and the outside constant velocity joint within the wheel, it was necessary to rework the design of the disc brakes which we made with a floating bracket of an original design. I would like to point out that these clamps are two-cylinder ones and that their pistons and packing are interchangeable with the items on the 2140 model. Not only the compact design of the constant-speed joint but also new double-row ballbearings help to gain space within the wheel. Incidentally, they do not require lubrication and adjustment during operation.

A certain combination of designs and parameters for the front and rear wheel suspension systems is required for a front-wheel drive car to preserve its "innate" advantages in handling characteristics and for it to be free of the shortcomings inherent in this design. That is why we use an independent spring suspension with longitudinal laminated arms, a U-shaped connecting beam and transverse reactive thrust (Panar thrust). This design was also favorable for putting together the parts of the body's rear portion.

All of these designs -- traditional and original -- were the result of a great deal of work by the collective of the AZLK Design Work Administration where practically every one made his contribution to the design of the new vehicle.

Let us turn to the body itself. It was made as a five-door, two-volume, hatch-back-type one in order to satisfy certain consumer demands (they were talked about at the beginning of the article). The requirements, which have taken shape at the present time for third-group light-class cars, determined its interior dimensions. The cabin's width at shoulder level is 1,400 millimeters (sufficient for three individuals in the back seat) and its length horizontally

from the non-depressed accelerator pedal to the center of gravity of the rear passenger seat is more than 1,670 millimeters. These dimensions not only permit five individuals to be accommodated with comfort but they also provide a rather large volume both for luggage on long trips and for oversized loads when the rear seat is folded down.

The configuration of front-wheel drive and the longitudinally placed power plant, which was selected for the Moskvich-2141, has provided an opportunity to move the passenger compartment much further forward. In addition, it created conditions for bringing the length of this compartment to 1,720 millimeters-- the largest size for models in the third group -- without any noticeable increase in the car's length and weight. Let us recall, that this dimension for the GAZ [Gorkiy Motor Vehicle Works]-24 and the Moskvich-2140, which are well known to us, is 1,744 and 1,590 millimeters, respectively.) At the same time, the distribution of weight along the length of a car with a rather large base (2,580 millimeters) is such that, when it is in an outfitted condition without a load, 61.5 percent of the weight is on the front wheels and with a full load -- 52.5 percent. These indicators insure good travelling ability and the necessary load on the front driving wheels, practically excluding their skidding.

Curved cylindrical glass is used in the side doors in order to increase the compartment's width as much as possible. The thickness of the side doors has been reduced thanks to the molded lining of the "porozo" type (incidentally, 64.5 kilograms of plastic items are used in the automobile). As a result, the width in the area of the passengers' shoulders and elbows in the rear seat area is 1,400 millimeters. As was said, this satisfies the requirements for automobiles in this group and this class. For comparison, the GAZ-24 has 1,495 millimeters and the Moskvich-2140-- 1,260 millimeters.

The width of the body's rear portion is quite important for the consumer qualities of automobiles with a hatchback type body. That is why the Moskvich-2141 rear suspension springs are located under the floor of the body as are the fuel tank and spare tire. As a result, the luggage compartment is 25 percent larger in volume than the 2140 model and is very wide -- 970 millimeters -- in the space between the rear wheel wells. Incidentally the width is the same at the opening of the fifth door. In other words, the size of the cargo, which can be accommodated in the luggage compartment, is 970 millimeters. If the rear seats are folded, the volume of the truck is tripled. This provides an opportunity to transport an undivided load with a length of more than a meter.

The rather large dimensional width of the body has permitted the wheel span to be considerably increased: the front to 1,440 millimeters and the rear to 1,420 millimeters (for the GAZ-24, they are 1,470 and 1,420 millimeters, respectively; and for the Moskvich-2140 -- 1270 and 1270 millimeters). The widening of the wheel span directly contributes to the improvement in the car's stability.

In addition to the luggage compartment, two covered side pockets for small items are provided between the rear wheel wells and the rear wall of the body.

The luggage compartment itself from the back of the rear seat to the inner surface of the fifth door is covered with a shelf on top.

Although the Moskvich-2141 has a much larger internal useful space and a luggage capacity increased by 25 percent, it is only 100 millimeters longer than the previous model 2140 and has almost the same equipped weight-- 1070 kilograms.

The body of the new Moskvich is an all-metal unitized one. Its elements, which form the strength frame, have a box section but its front part has been lightened in order to decrease its metal-intensiveness. There are no strength elements in front of the forward wheel wells except the members of the frame. The front and rear bumpers and the splash guards, which cover the lower part of the front and rear of the body, are made of polycarbonate. The car's external appearance is protected by an industrial model certificate.

A great deal of attention has been devoted to the comfort of the driver and passengers and to their safety. All operating controls and switches are within reach of the driver's hands; the levers, which control the operation of the lights, signal lights, three-position windshield wipers, and windshield washer have been placed on the steering column. Along with the traditional speedometer, tachometer, indicators for the fuel level and temperature of the cooling liquid, and test lights, the instruments include a volt-meter and a vacuum-operated economy meter.

Concerning safety, the front and side rear seats are equipped with inertia-operated belts from the Norma Association. For the first time in domestic practices, the rear seats have reels with a horizontal belt exit. The automobile is equipped with three rear view mirrors: an interior two-position one and external ones, one of which is remotely controlled from the passenger compartment.

The lighting equipment completely corresponds to international standards. The FER (GDR) Combine has developed special N4 halogen lamps for the headlights. The headlight lenses and the turn indicators, which are located nearby, harmoniously flow into the surface of the body's front. Jacks for fog lights have been provided on the front bumper's lower splash guard. In order to increase safety, the rear lights have been made in five sections: turn indicator, side-light, stop signal, reflector (cat's eye), and fog light.

The body's equipment includes front seats with headrests, which can be adjusted for the slope of the back and longitudinal displacements, and two speakers and a radio receiver in the instrument panel. In addition, it is planned to equip part of the vehicles with a rear window wiper, a radio-tape recorder, and side turn indicator repeaters.

During the development and finishing of the Moskvich-2141 body, special attention was paid to its aerodynamics. We began the search for the least wind-resistance form by blowing at models (scale 1:4) in the Mechanics Institute of the Moscow State University. Subsequently, we tested full-scale models in TsAGI [Central Aero-Hydrodynamics Institute] (USSR) and the Saint Cyr (France) research center wind tunnels.

By subsequently changing the configuration of the hood, roof, rear, front and rear bumpers, lower surface of the bottom, lower mud guards, and the front angles and sides of the body, we achieved a smooth flow of air over the car's surface. At the same time, we selected locations for the openings for air coming into the body and exiting from it (cooling, ventilating and other systems). As a result, we managed to lower the drag coefficient to 0.35 and with the use of spoilers and other interconnected aerodynamic elements -- even to 0.325.

In the final analysis, the expenditure of fuel at a speed of 90 kilometers per hour was lowered by 16-19 percent and at 120 kilometers per hour -- by 19-20 percent thanks to the lower aerodynamic resistance and to the use of a fifth-overdrive-gear. Concerning maximum speed, it has grown by six percent thanks to the more improved aerodynamics.

The Moskvich-2141 greatly exceeds the previous model based on a number of other operating indicators, on passive and safety features, comfort, and handling characteristics. The labor-intensiveness of maintenance has been considerably reduced.

The work of the designers to improve it and to better its consumer qualities will not stop when the Moskvich-2141 begins to come off the assembly line. Other ways to make and complete equipment and also different types of bodies will be provided for. In particular, it is planned to equip the new Moskvich with electronic systems that will control the operation of the engine, an on-board computer, and other devices and instruments. As production is expanded, its individual parameters and the amount of completeness and construction of assemblies and items will inevitably change. That is why technical characteristics will be made more precise and reported to the magazine's readers separately.

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MOTOR VEHICLES AND HIGHWAYS

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FRUNZE-OSH HIGHWAY TUNNEL CONSTRUCTION DETAILED

Moscow TRANSPORTNOYE STROITELSTVO in Russian No 5, May 86 pp 16-17

[Article by engineers L.D. Levin and V.P. Pedenkov (Gidrospetsproyekt):
"Tunnels on the Frunze-Osh Highway"]

[Text] Successful operation of tunnels with a lightweight anchored and sprayed concrete lining instead of the traditional monolithic reinforced concrete lining and also the achievement of saving 300,000 rubles make it possible to assess this structure and the process of erecting it by stages as a promising direction in vehicular traffic tunnel construction.

Three tunnels have been built on the Frunze-Osh main highway. Their cross-section was selected taking into account the transport of transformers for the Kambaratinskaya and Toktogulskaya hydroelectric power stations [GES].

Tunnel No 1 is located on the left bank of the Naryn River in the area of the Kurpsayskaya GES and is cut in an interbedded mass of sandstone and argillite. Through the tunnel's entire route the rock is broken by tectonic cracks up to 300 mm wide. The cracks are filled mainly with ground material, less often with rubbing clay, and sometimes with rare crushed stone.

Tunnels Nos 2 and 3 are situated on the left bank of the Kurpsayskiy Reservoir and are cut in thick-layered dolomitic limestone.

The tunnel construction plan was developed by the Gidrospetsproyekt Institute with involvement of the TsNIIS All-Union Scientific Research Institute of Transportation Construction.

Modern advanced technology of building vehicular traffic tunnels (cutting the entire cross-section, using highly efficient tunneling equipment, dividing sections of tunneling work and sections for erecting the lining, eliminating work on reinforcing the working) is based on a consideration of the load-bearing capacity of the rock mass. This is achieved by using lightweight supports of anchors and sprayed concrete and organizing their static operation by reinforcing a working with a thin layer of sprayed concrete immediately

after it is exposed and installing anchors with subsequent reinforcement with additional members to stabilize the deformations of the working.

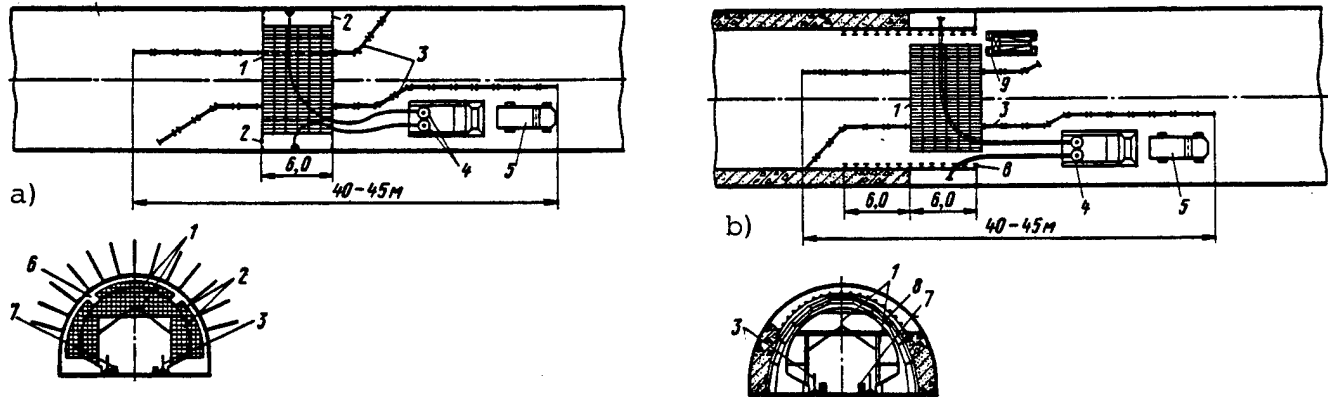


Diagram of construction operations: a-sprayed concrete lining; b-reinforced concrete lining; 1-rolling scaffolding; 2-steel netting with rubberized fabric; 3-solid barrier 2 meters high made of adjustable screens; 4-BM-68 concrete sprayers on an APBU-2 platform; 5-MAZ-503A truck; 6-ventilation windows; 7-wheel bumper bar; 8-metal bow members with board forms; 9-MShTS-2 TP special hydraulic hoist.

As a result of developing variants of vehicular traffic tunnel construction, the variant of building the main portion of the tunnels with a combination lining of sprayed concrete and anchors with an overall length of 872 meters was realized as the most effective. Reinforced concrete lining was used only at the sections near the portals.

In the first stage of the calculations, a support of anchors and sprayed concrete was recommended. Later the lining parameters for all conditions of construction, which determined the following sequence of construction, were calculated on a computer.

In the first stage, after developing a face, anchors were installed with a 1.3 meter spacing, and a layer of sprayed concrete 3-5 cm thick was applied. After completion of the cutting work in the tunnel (i.e., after complete stabilization of deformations) a secondary lining of sprayed concrete 10 cm thick was made.

Earthquake-proof belts of slab reinforcing cages installed in each row of anchors were provided to take up seismic stresses.

Construction of the tunnels was accomplished by the Kirghiz Specialized Administration of the Gidrospestsstroy All-Union Association. Each tunnel was driven basically with one face. The maximum achieved speed of driving for one face was 53 meters per month.

They used SBU-2 drilling rigs for drilling blast-holes to a height of up to 6 meters; up to 9 meters they used drilling frames designed by the Kirghiz Specialized Administration of Gidrospetsstroy. The blasted rock was loaded by PNB-3D machines into MAZ-503A and T-200 dump trucks. They used BM-68 concrete sprayers mounted on an APBU-2 platform for spraying concrete. Placement of concrete in the lining was done with APBU-2 pneumatic concrete layers. Special MShTS-2 TP hydraulic hoists were used for working at heights.

Metal I-beam arches cast with M200 concrete were used as a temporary support when cutting at the sections near the portals in zones affected by large tectonic cracks; in other areas they used reinforced concrete anchors 22 mm in diameter and 2.75 meters long, spaced 1.3 meters apart and sprayed M300 concrete 3-5 cm thick.

All three tunnels were driven by the time the first unit of the Kurpsayskaya GES began operation ahead of schedule.

A permanent lining was made in tunnel sections passing areas of erosion and dumping and areas affected by large tectonic cracks. The remaining sections were reinforced with a temporary concrete support or reinforced concrete anchors with sprayed concrete at least 5 cm thick. Cradle concrete was placed on the roadway within limits of the operating gear train.

In connection with flooding of a section of highway on the right bank of the Naryn River by the Kurpsayskiy Reservoir, the builders and designers were tasked with providing passage of transit transports over the highway being built on higher elevations with simultaneous continuation of the work to complete its construction.

The tunnels required 200 meters of reinforced concrete lining, 610 meters of sprayed concrete lining, construction of the roadway, and installation of permanent service lines for power supply, lighting, and ventilation.

A plan was developed at the Gidrospetsproyekt for organizing work which would provide for combining the passage motor transport with performance of construction and installation work. The following measures were developed there and implemented by the builders for passage of transit traffic through the tunnels alternately in both directions.

Two-section traffic lights were installed at the areas near the portals, which were controlled by signallers. Appropriate road signs were set up on approaches to the tunnels.

Traffic lanes at least 3 meters wide protected by a wheel bumper bar were provided for passage of transit traffic through the tunnels. Work areas were partitioned off by a solid enclosure 2.0 meters high made of adjustable screens.

Construction of the sprayed concrete lining (figure a) was done from rolling scaffolding designed by the Kirghiz Specialized Directorate of Gidrospetsstroy. To protect the passing traffic from "bouncing off" the

scaffolding, a metal screen with rubberized fabric was placed on the scaffolding on the traffic lane side, and on the end protective shields with ventilation holes were made.

The reinforced concrete lining was constructed by using wooden forms framed with metal bow members (figure b). The use of movable metal forms could have simplified the work considerably, but were not used because of the various standard sizes of the linings (in connection with the presence of curved sections in tunnels 2 and 3).

Traffic through the tunnel was stopped during installation of the arches. After arches were taken down, the worker scaffolding was moved under the concreting block, from which assembly of the reinforcement and forms was done and which separated the transit traffic lane from the area of work above.

Construction of the roadway and installation of permanent service lines were done on one side of the tunnel, with passage of transit traffic on the other side.

When performing individual types of work (assembly and dismantling of bow members, moving scaffolding, assembly and dismantling of wheel bumper bar, and enclosing working zones), the tunnel was periodically closed to traffic. As vehicles began to build up at the portals, urgent steps were taken to ensure their passage right up until work stopped in the tunnel.

Today, the tunnels described are successfully operating, having withstood three earthquakes with a force of up to 5 points.

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MOTOR VEHICLES AND HIGHWAYS

IMPROVING MOTOR VEHICLE GRAIN HARVEST SUPPORT IN KAZAKHSTAN

Alma-Ata AVTOMOBILNYY TRANSPORT KAZAKHSTANA in Russian No 6, Jun 86 pp 2-3

[Article by T. Mustafin, chief of the Freight Shipments Administration, KaSSR Ministry of Motor Transport: "Make Transport Harvest Support Equal to the New Tasks"]

[Text] The 27th CPSU Congress has tasked the country's agriculture with making a decisive improvement in the agrarian sector and stepping up the rate of growth of agricultural production. All this places an increased responsibility on transport workers to ensure timely, complete, and quality service to the agro-industrial complex.

There are possibilities for improving our work in this direction. In recent years the ministry's motor vehicle fleet has been replenished with a considerable number of heavy-freight vehicles and tractor trailers, and the network of motor vehicle transport enterprises located in rural areas has been expanded. Carrying capacities have increased sharply. This has made it possible to satisfy the transport needs of the republic's agricultural enterprises and organizations more smoothly.

However, today the final phase of agricultural production--the harvest--requires special efficiency in the work of motor transport and the interaction of all elements of the agro-industrial complex.

Comrade D.A. Kunayev, CPSU Central Committee member and first secretary of the Central Committee of the Communist Party of Kazakhstan (CPKa), emphasized in a report at the Second CPKa Plenum, "It is a matter of honor for the republic party organization, all workers, above all those in rural raykoms and rayispolkoms, farm administrators, and everyone associated with agricultural production to harvest at least 29 million tons of high-quality grain this year. Literally everything must be mobilized to do this."

These requirements must be set as the basis of all preparatory work being conducted today in the collectives of motor vehicle enterprises to ensure a high technical readiness of the truck fleet by the start of the harvest season and organized mass transporting of agricultural products of the new harvest. This is especially so, since this year the question of conducting the harvest

with the least material and labor expenditures is especially acute. First and foremost this requires transporting the entire crop with fewer motor vehicles and not permitting losses and idle time of harvesting equipment.

During this year's harvest it is necessary to abandon completely the faulty practice of rigidly assigning motor vehicles to combines which in some cases leads to idle time for transport while waiting for grain output and in other cases results in idle time for combines when the motor vehicle is en route. Many years of experience of leading collectives has convincingly proven that the highest productivity of harvest units and motor vehicles is achieved by forming harvester-transport complexes and organizing the work of combines by the large-group method, making wide use of rotating trailers and collecting bins.

However, it should be noted that the administrators of a number of motor vehicle administrations are still not sufficiently studying questions of broader incorporation of combine-trailer and batch systems of hauling and do not demonstrate proper initiative and persistence in eliminating the causes restricting general use of these progressive resource-conservation methods. Last year the Vostochno-Kazakhstan, Karaganda, Semipalatinsk, and Dzhambul motor vehicle administrations did not ensure fulfillment of established goals for introducing progressive methods.

Administrators of individual motor vehicle enterprises try to explain the non-fulfillment of established goals by the low crop yield at the sovkhozes and kolkhozes being serviced. However, these excuses are completely unfounded. Experience shows that with a low crop yield it is more advisable to organize hauling of grain from the combines by using the batch method and keep trailers in the field, but not the motor vehicles, which would be forced to stand idle for 2-3 hours waiting for the grain output.

During last year's harvest, the Taldy-Kurgan Motor Vehicle Administration's use of additional grain bodies was extremely unsatisfactory; their utilization factor was 0.465. In the Semipalatinsk, Aktyubinsk, Severo-Kazakhstan freight and Uralsk motor vehicle administrations it fluctuated from 0.412 to 0.460.

The opportunities for using the trailer fleet both in transport servicing of harvesting units and in delivery of agricultural products to state receiving points are unlimited. However, in September of last year the percentage of freight turnover using trailers decreased in the Turgay, Tselinograd, Kzyl-Orda, Kustanay No 2, Dzhezkazgan, and Pavlodar freight motor vehicle administrations.

In order to preclude repeating the mistakes of last year, during the preparatory period administrators of motor vehicle administration need to devote special attention to organizing a coordinated system of the work of motor vehicle transport enterprises with sovkhozes and storage agencies. They should begin without delay to develop joint plans for upcoming harvest-transport and transport-storage operations, specify in them the times and volumes of shipments, and determine and implement organizational measures aimed at their smooth and absolute fulfillment, taking into account wider use of resource-conserving transport methods.

It is necessary immediately to begin forming harvest-transport complexes and brigades jointly with the administrators of sovkhozes and kolkhozes, conduct organizational and explanatory work with the drivers, combine operators, and tractor operators for switching the complexes and brigades to a collective contract, and also organize classes for studying progressive methods.

Special attention should be given to timely and qualitative preparation of rotating trailers designed for operation under combine-trailer and batch systems hauling. In addition, each motor vehicle enterprise must determine their need for rotating trailers, taking into account a sharp increase in the number of brigades switching to progressive methods, and establish day-to-day monitoring of repair and preparatory work.

Using rotating trailers for hauling grain from the combines will require a higher level of mechanization of unloading tractor and trailer rigs at threshing floors.

For the time being, unfortunately, most of the threshing floors are equipped with low-capacity truck scales and siding truck-unloaders. This machinery is not adapted for weighing and unloading truck and trailer rigs and has a limited-capacity hoppers with low-capacity grain conveyors.

Administrators of motor vehicle administrations and motor vehicle enterprises should check the condition of operating threshing floor ahead of time jointly with the collectives of the sovkhozes and kolkhozes being serviced.

In doing this, special attention should be given to equipping the threshing floors with machinery making it possible to unload tractor and trailer rigs without unhitching. In addition to stationary and mobile unloaders, this requires wide use of the simplest means of mechanization--tipper, scrapers, and chutes--which can be manufactured by one's own manpower.

First of all, questions of organizing efficient planning of hauling should be resolved, making maximum use of computer technology.

There were substantial shortcomings during last year's harvest. A number of motor vehicle administrations did not ensure formation of centralized motor vehicle teams and proper dispatch supervision of shipments at elevators.

Thus, the Kustanay motor vehicle administrations No 1 and 2, the Semipalatinsk, Taldy-Kurgan, Vostochno-Kazakhstan, and Turgay freight motor vehicle administrations did not fulfill the established goal for organizing shipments of agricultural products to receiving points according to time schedules.

This year it is necessary to improve the organization and management of transport-storage operations radically. Proposals should be prepared ahead of time and submitted for examination and approval to the oblispolkoms for assigning to grain receiving enterprises the necessary amount of heavy-freight trucks and tractor-trailer rigs, taking into account actual shipment volumes the capacity of laboratory and weighing facilities and unloading points, and

also for forming motor vehicle teams from these transport resources to haul agricultural products to storage points according to time schedules.

In the time remaining until the start of mass shipments, time schedules should be calculated jointly with the agricultural and storage agencies and a precise order determined for their efficient recalculation during the work, depending on the hauling conditions developing.

It is necessary to increase sharply the role and importance of shipment control centers set up at the elevators. To do this, it is necessary to allocate them appropriate facilities, provide communications equipment, and man them with a staff of qualified workers capable of successfully resolving problems of operational control.

Measures should be taken to improve considerably the organization of hauling vegetables, potatoes, melons, and fruits; specialized motor vehicle columns should be set up for this purpose. Preparatory work should be conducted jointly with KaSSR State Agro-Industrial Committee enterprises ensuring the maximum expansion of the use of special containers and motor vehicles equipped with automatic unloading cranes for these shipments.

As in previous years, it is necessary to ensure mass use of tractor-trailer rigs in hauling agricultural products. Work must be stepped up in collectives for disseminating the wealth of experience gained in driving heavy tractor-trailer rigs, and young drivers must be involved in this important matter.

An equally important issue is the qualitative preparation of grain routes for massive transport of grain.

All necessary measures must be taken and everything possible jointly with the road-construction organizations of the oblast to ensure timely repair and also to improve the maintenance of highways and accesses to sovkhoses and grain-receiving enterprises.

Well-organized socialist competition for achieving the highest labor productivity, for maximum effective equipment utilization, and for achieving the best end results should contribute to successful mass transport of agricultural products. Before the start of the harvest it is necessary to conduct organizational work in the collectives and see that every driver and every driver brigade make increased socialist commitments--to transport the maximum amount of agricultural products in compressed time periods and without losses with less material and labor expenditures.

One should carefully think through questions concerning more effective material and moral incentives for the best drivers, popularizing progressive methods, and ensuring widespread publicity.

Unremitting attention must be given to selection of drivers sent to the harvest. In so doing, it is necessary to pay attention to their moral and businesslike and professional qualities, to reinforcing the inspector service, and to increasing the demands on engineering and technical workers.

There is no doubt that in labor cooperation with workers of agro-industrial associations, motor vehicle administration collectives will ensure more widespread introduction of progressive methods in organizing harvest-transport and transport-storage work, conduct massive transport of agricultural products on a higher level, and make a worthy contribution toward successful fulfillment of the decisions of the 27th CPSU Congress and the 16th CPKa Congress.

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MOTOR VEHICLES AND HIGHWAYS

MOTOR VEHICLE HARVEST SUPPORT WORK IN KOKCHETAV OBLAST

Alma-Ata AVTOMOBILNYY TRANSPORT KAZAKHSTANA in Russian No 6, Jun 86 pp 16-17

[Interview with N. Starkin, deputy chief of Shchuchinsk Motor Column 2585, and A. Veselov, journalist of the rayon newspaper LUCH, by AVTOMOBILNYY TRANSPORT KAZAKHSTANA correspondent V. Penkov: "Do Not Repeat Mistakes"]

[Text] The extra hard work performed at harvest time last year convincingly showed that only efficient interaction of farm administrators, motor vehicle workers, and purchasing agents, their complete mutual understanding, efficient maneuvering of equipment, and management of the entire harvesting and procurement conveyor will yield the desired results. Unfortunately, the problem of such interaction remains unresolved in many places from one year to the next.

How can we see that the mistakes of previous harvests are not repeated? Our correspondent V. Penkov ponders this today with N. Starkin, deputy chief of the Shchuchinsk Motor Column 2585, and A. Veselov, journalist from the rayon newspaper LUCH.

[Penkov] The many years of experience of using the motor vehicle fleet during the harvest campaign in Shchuchinskiy and other rayons of Kokchetav Oblast justify a certain conclusion: It is necessary to assign as much equipment for servicing combines and also for hauling silage and grain to trenches and threshing floors, grain receiving points and elevators as is required by transporting by progressive methods--combine-trailer and batch systems and time schedules. Practically every year farms always request higher organizations to assign a motor vehicle for each combine. It is simple to explain this faulty custom: kolkhoz and sovkhos administrators do not wish to reorganize their work based on time requirements and specific proposals of motor vehicle operators. Worse than that, at the height of the harvest the "arguments" of the farmers, paradoxical as it may be, are supported by rayon and sometimes oblast administrators of operational harvest staffs. Then, to the detriment of the entire economy, they have to "hunt up" transport vehicles to send to this alleged "hot" spot, although these vehicles are much needed by other sectors of the national economy as well.

[Starkin] I agree with you completely. Last year, for example, by order of higher agencies, our motor column dispatched 218 motor vehicles and 232 trailers--in short, everything we could send. But the farms used this huge force inefficiently, to say the least.

Let us take the initial period of the harvest--the hauling of silage bulk to its storage locations. The work was organized very poorly. I will cite some facts as proof: at the "Yuryevskiy," "Pervomayskiy," "Voronovskiy," "Zeleborskiy," and "Zolotoy kolos" sovkhoses, our trailers were practically not used by the Shchuchinsk ARSKhO. This was because the administrators of the farms did not learn any lessons from past harvests and did not meet our proposals to introduce the combine-trailer system of shipping bulk silage from the plantations. As a result, there was a long delay in harvesting silage crops, which ultimately were subjected to sudden frosts and lost their nutritional value. And we, the motor vehicle workers, lost tens of thousands of rubles due to idle time of trailers, excess fuel consumption, and frequent breakdowns of transport directly in the fields, which as we know are not like a highway or asphalt road, especially after rains.

[Penkov] Incidentally, the so-called "silage" problem was trouble not only in your rayon and oblast, but in nearly all regions of Kazakhstan. Many of the farm workers do not prepare access roads to the silage trenches and pits or equipment for unloading trucks with sides and do not assign tractors for hauling trailers from the fields to the shoulders of the roads. This has repeatedly been stated at various levels of management of our national economy, as well as in the press.

But let us talk a little about the grain harvest.

[Veselov] Every harvest season I travel with the motor vehicle workers of the motor column to sovkhoses in Shchuchinskiy Rayon. There has been so much criticism towards the farms with regard to poor organization of the harvest-transport process! Alas, all the articles in rayon and oblast press were like a voice crying in the wilderness. Nothing has changed. Every sovkhos needs to modernize the mechanized threshing floors, grain receiving points, and elevators for unloading and loading large-capacity truck and trailer rigs and to make widespread use of progressive methods of transporting agricultural products. In this connection, the position of farm administrators who do not desire to keep up with the times is totally incomprehensible.

I can cite a graphic example of the poor management that reigns supreme at the Shchuchinsk Elevator during every harvest. What could be better than delivering grain from the threshing floors according to computer-developed time schedules? But they are continually being violated. Why? I consider the work of the rayon operations staff in managing the harvest-storage complex to be very poor. How else can you explain the fact that up to 100 or more motor transport vehicles line up waiting to unload. In addition to Motor Column 2585, these vehicles belong to the "Transselkhoztekhnika" ATP, the "Kotyrkolskiy" sovkhos-tekhnikum, and nearby sovkhoses.

When we made the next run, grain threshing was completed at the majority of the farms and much grain had accumulated at the threshing floors; but we would note that for the most part it had not been prepared. Naturally, so as not to be among those lagging behind, in such a situation the sovkhoz administrators report that they have a certain number of tons of grain and need a certain number of vehicles to transport it to the grain receiving points. An the long-known mess begins: the rayon staff orders a certain number of the motor columns vehicles to be "rushed" to one farm, a certain number to another, and yet another. In addition, department transport is put into operation. Where are they observing the time schedules?

Many days in a row the motor column's leading drivers N. Vinogradov, V. Roslyakov, A. Shumanov, I. Aleksandridi, and Yu. Vagner stood idle in their tractor-trailer rigs at the elevator for 3-4 hours. And this is all during the daytime. Night shipments are not made very often in rayon. Sovkhoz administrators explain this by the fact that they have no one to load the tractor-trailer rigs.

[Starkin] There's no denying that, and I would like to turn our attention to a simple truth: Where the farmers are convinced in practice of the obvious advantage of progressive methods of hauling grain, they do not want to work any other way. Take, let's say, the "Pervomayskiy" Sovkhoz. You know how difficult it was here to get accustomed to the batch method; the combine operators had no faith in it, that's all there is to it! But when they tried it themselves, worked under it a while, and became used to it, they understood that there is no better method.

At this farm and at the "Urumkayskiy" Sovkhoz, pretty good conditions for highly productive work were created for the drivers. We set up mobile motor vehicle camps with the necessary repair base there. Drivers and mechanics could bathe, shower, and rest well after their shift. They put their hearts into working. Among those who proved to be excellent workers were N. Anistratenko, A. Gutnik, V. Zenchenko, V. Ivanchenko, and others.

[Penkov] No one will forgive the motor vehicle operators that have switched to the new conditions of economic operations management for inefficient use of trailers in the 12th Five-Year Plan. Complete support of maximum shipments largely depends on whether the kolkhozes, sovkhozes, grain receiving points, and elevators are ready to make efficient use of motor transport vehicles, especially the trailer fleet, and to employ progressive methods of delivering agricultural products.

[Starkin] It is high time to put an end to the lack of coordination between departments, especially during the period of mass crop harvest. After all, the joint orders of the KaSSR Ministry of Motor Transport, the KaSSR State Agro-Industrial Committee, and the Ministry of Procurement, issued in past years, are continually not being carried out at the majority of points.

We believe that our motor column can take on the entire transport of grain from the threshing floors to the elevators and grain receiving points without involving departmental transport. We ourselves have determined how many motor vehicles and trailers will be required for this--we have such experience. One

more thing. It is time, finally, to make the first administrators of sovkhoses and procurement enterprises, who are equal to us motor vehicle workers, strictly morally and materially responsible for inefficient and poor utilization of motor transport resources. Above all, this applies to organizing shipments on sections of the field--the threshing floor, plantation, silage trench. On our part, we will pledge to prepare motor vehicles, the trailer fleet, motor vehicle camps, and the necessary supply of rotating units, mechanisms, and spare parts well for harvest time and will select the most worthy drivers and mechanics in order to pass our primary examination of the first year of the 12th Five-Year Plan.

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RAIL SYSTEMS

BRIEFS

MOSCOW RAILROAD DIVISIONS MERGE--The Moscow-Yaroslavl and Moscow-Riga Divisions of the Moscow Railroad were combined into one division--the Moscow-Yaroslavl Division of the Moscow Railroad--on 1 June 1986 in accordance with the general plan for administration of rail transport and in connection with the economic experiment conducted on the Moscow Railroad to improve work efficiency. The boundaries of the Moscow-Yaroslavl Division are located at the stations of Kubinka-1 (not included), Shakhovskaya (included), Povarovo-1 (not included), Savelovo (not included), Aleksandrov (included), Belkovo (included), Potochino (not included), Fryazevo (not included), Losinoostrovskaya (included), Beskudnikovo (included), and Podmoskovnaya (included). [Text] [Moscow GUDOK in Russian 7 Jun 86 p 2] 8936

NEW PASSENGER STOP IN UKSSR--A new passenger stop in the Mironovka--Tripolye-Dneprovskoye section of the Kagarlyk--Tripolye-Dneprovskoye line has been assigned the name Ozernyy (code 36421). The Ozernyy passenger stop is 22 kilometers from the Kagarlyk station and 14 kilometers from Tripolye-Dneprovskoye. [Text] [Moscow GUDOK in Russian 7 Jun 86 p 2] 8936

NEW PASSENGER STOP NEAR GORKIY--A new passenger stop in the section from Gorkiy-Sortirovochnyy to Kotelnich-1 on the Linda-Tarasikha line has been assigned the name Keza (code 28541). The Keza passenger stop is 6 kilometers from the Linda station and 4 kilometers from the Tarasikha station. [Text] [Moscow GUDOK in Russian 7 Jun 86 p 2] 8936

NEW BORDER TRANSFER STATION--The Motykaly stop in the section from Brest-Tsentralnyy to Vysoko-Litovsk on the Belorussian Railroad has been changed over to the station category and is engaged in the transshipment of imported freight. The Motykaly station does not receive and dispatch freight in domestic or international traffic. It is open for operation only in accordance with Section 0 of Tariff Manual 4. The Motykaly station, which has been assigned the new code of 14120, is 34 kilometers from the national border and 15 kilometers from the Brest-Tsentralnyy transit point. [Text] [Moscow GUDOK in Russian 7 Jun 86 p 2] 8936

YEREVAN METRO CONSTRUCTION UPDATE--Yerevan--The entire area of Spandaryan in the city's Leninskiy Rayon is a vast construction site. The collective of the Yerkommunistroy Trust is erecting the entrance hall for the new metro station, a motion picture theater, stores, a cafeteria, and underground passageways. And other construction may be seen by going below. Tunnelers, concrete layers, insulators, track workers and electricians are working day and night. Laying of track has begun between the "Shengavit" and "Ploshchad Spandaryana" stations. The second underway project of the Yerevan Metro is the "Oktemberyan" station, which is being built under continuous traffic conditions. The basic operations to drive the station tunnel were performed at night, which has delayed its commissioning. Stations are very seldom built on an operating line in metro construction. And the main difficulty, perhaps, has been in ensuring the safety of train traffic and the persons working underground. "We will turn over the station to the finishing workers soon," says A. Arakelyan, the tunnelers brigade leader. [By S. Markosyan, Yerevan] [Text] [Moscow GUDOK in Russian 27 May 86 p 1] 8936

BESLAN-GROZNYI LINE ELECTRIFIED--(TASS)--An important stage in electrification of the North Caucasus Railroad has been completed. Power has been supplied to the catenary system of the last 100-kilometer section from Beslan to Groznyy, and the first passenger train with electric traction has departed for Moscow. The mechanized subunits of the Ordzhonikidzetransstroy Trust accomplished a great deal of work in a brief period of time. [Text] [Moscow GUDOK in Russian 22 Jun 86 p 2] 8936

SFRY-BUILT CARS FOR SIBERIA--Belgrade--There is unusual excitement in the car building shop of the (Gosha) Machine Building Plant in the city of Smederevska Palanka these days. Its collective is getting ready to send off the first railway car in a new series, developed jointly with Soviet specialists, to the international exhibition "Railroad Transport 86" in Moscow. The USSR's order calls for cars of a new type to be built at the enterprise. Made of stainless steel, they should withstand extreme drops in temperature from 50 degrees above to 60 degrees below zero. It is planned to use the new cars on the Trans-Siberian Mainline and the BAM [Baykal-Amur Mainline]. As Milorad Abramovic, one of the managers of the production program for the USSR, told journalists, the "all-weather" cars have been designed to travel up to 160 kilometers per hour. Each one of them has 12 four-place sleeping compartments. Modern heat-resistant materials have been used to finish the lounge cars and passageways. The (Gosa) Combine, named in 1950 in honor of the Yugoslav national hero Dragoslav (Dordevic-Gosa), is a traditional partner of Soviet organizations. It has been supplying the USSR with equipment for ferrous metallurgy, particularly the coal-tar chemical industry, for many years. As they observe at the enterprise, the order for Soviet railroads will contribute to further consolidation of economic ties between the two countries. [By TASS correspondent K. Vorobyev, especially for GUDOK] [Text] [Moscow GUDOK in Russian 25 Jun 86 p 3] 8936

MINISTRY STUDIES CAD INSTRUCTION--A training methods conference has been held at the All-Union Institute for Skill Improvement of the MPS [Ministry of Railways] on the topic of basic directions for instruction in computer aided design. A special new laboratory was set up at the institute recently for this purpose. A. Alferov, director of the VIPK [All-Union Institute for Skill Improvement], discussed its role and goals. Yu. Khandkarov, chief of the Computer Technology Main Administration of the Ministry of Railways, outlined the prospects for computer applications. V. Knyazevskiy, deputy chief of the main administration; Professor V. Mastachenko of the MIIT [Moscow Institute of Railroad Transportation Engineers]; and other scientists and specialists also delivered reports. [By I. Vanyat] [Text] [Moscow GUDOK in Russian 27 Jun 86 p 2] 8936

SARY-SHAGAN--CHIGANAK ELECTRIFICATION--Alma-Ata--The first trains with electric traction have traveled over the 140-kilometer section from Sary-Shagan to Chiganak. The plan for the second quarter called for electrification of only part of this section, but subunits of the Tselintransstroy Trust, utilizing advanced construction methods, not only fulfilled the plan and turned over 92 kilometers of the complex under construction from Sary-Shagan to Myn-Aral to the state commission, but made a construction start for continuation of operations as well. [By GUDOK correspondent G. Isakov] [Text] [Moscow GUDOK in Russian 5 Jul 86 p 1] 8936

KOKCHETAV-VOLODARSKOYE LINE ELECTRIFIED--Tselinograd--A freight train with electric traction has arrived at the Volodarskoye station from Kokchetav. It was taken there by engineer K. Baymagambetov and his assistant V. Reshetnik, under the supervision of engineer-instructor Ya. Seyvald. The crew won this privilege in competition with dozens of the other best locomotive brigades. Collectives of SMP-657 [construction and installation train No 657]; SMP-659; gorem-22 [advance repair train No 22] of the Kokchetavtransstroy Trust; and power trains No 706 and 703, which came from the Sverdlovsk and South Urals Railroads, took part in the electrification. Specialists from SMP-864 and EP-76 [possibly: electrical work train No 76] completed the assembly and checkout of the STsB [signalization, centralization and block system] units. And persons sent from 10 power sections of the Tselin Railroad, including those representing the Shokayskaya, Perekatnaya and Amankaragayskaya subdivisions who distinguished themselves, were employed in aligning and testing the catenary system and power facilities. Electrician Ye. Yerzhanov and fitter M. Sadvakasov from the Zhelezorudnaya subdivision and many of their colleagues also demonstrated first-rate performance and enviable productivity. Electrification of the 95-kilometer section just put into operation is essentially just the start of the changeover in the entire route of the Sredsib [Central Siberian Mainline] to the advanced form of traction. Electric locomotives will be operating over its entire length on the Tselin Railroad--from Kzyl-Tu to Presnogorskovskaya--in the current five-year plan. [By GUDOK correspondent L. Turov] [Text] [Moscow GUDOK in Russian 5 Jul 86 p 1] 8936

LARGER-CAPACITY BOXCAR PLANNED--Altay Kray--The prototype of a new boxcar with a capacity of 149 cubic meters has been manufactured at the Altay Car Building Plant. It is more spacious than those now being produced, and has doors with bottom suspension, interior polymeric coating, and gear for securing freight. The use of each such car will make it possible to economize more than 3,500 rubles annually. The prototype of the new boxcar has been sent to the international "Transport 86" exhibition in Moscow. A model of it will be on display at the VDNKh [Exhibition of Achievements of the National Economy], and another model has been sent to the PRC for display at the commerce and industry exhibition in Beijing. [By L. Parushkova] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 9 Jul 86 p 1] 8936

KRASNOYARSK METRO SURVEYING WORK--Krasnoyarsk--Surveying work for construction of a metro has begun in the kray center on the Yenisey. This economical and flexible form of transport has long been critically necessary in the city. The largest industrial and cultural center of Siberia, Krasnoyarsk has spread out on both banks of the mighty Yenisey, extending for dozens of kilometers from south to north and from east to west. The first 19-kilometer line of the metro will connect the new housing tracts with each other. [By P. Zinkev] [Text] [Moscow SELSKAYA ZHIZN in Russian 13 Jul 86 p 1] 8936

LENINGRAD METRO CONSTRUCTION UPDATE--The Lenmetrostroy collective was faced with a complicated task when it began construction of the second section of the metro's new line on the right bank. In view of the fact that approval of the planning assignment was delayed, the metro builders began tunneling late as well. Nevertheless, it can now be said that the second section of the line on the right bank will be turned over in 1990, as specified by the socialist pledges. The open-cut tunneling method introduced in the section is helping in this to a large extent. Starting from a functioning pit shaft with two tunneling machines, the combined brigades of I. Sinichkin and A. Matveyev from Lenmetrostroy's SMU-15 [construction and installation administration No 15] will drive the tunnels without stops for disassembly and assembly of the tunneling machines. By working in four shifts with efficiently organized soil removal, the metro builders are achieving record speed in tunneling--up to 400-500 meters per month. [By GUDOK correspondent V. Yurasov] [Text] [Moscow GUDOK in Russian 20 Jul 86 p 2] 8936

VOLGA RAILROAD STATION UPGRADED--Siding No 1 of the Volga Railroad has been changed to the station category and assigned the name Aksarayskaya-2. It is open for receiving and dispatching freight in carload consignments acceptable for storage on the station's open areas, as well as for receiving and dispatching freight in carload and small-sized consignments, with loading of entire cars on sidings and locations not generally utilized, that is, in accordance with Sections 1 and 3 of Tariff Manual No 4. The Aksarayskaya-2 station has been assigned code 66120. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

MOSCOW RAILROAD STATION DOWNGRADED--The Moscow-Tovarnaya--Smolenskaya station on the Moscow Railroad is being closed for the acceptance and dispatch of freight in carload consignments which require storage in open yards of the station, that is, in accordance with Section 4 of Tariff Manual No 4. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

NEW SOUTH URALS PASSENGER STOP--The name of Hero of the Soviet Union Aleksey Ivanovich Kashirin has been given to a passenger stop at kilometer 2,026 in the Berdyaush--Poletayevo-1 section (the Chebarkul-Misyash line) on the South Urals Railroad. It is called the Kashirinskiy passenger stop, assigned code 84451. The Kashirinskiy passenger stop is 3 kilometers from the Chebarkul station and 3 kilometers from the Misyash station. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

TERMEZ RAILROAD STATIONS MERGED--The Termez-Port station has been excluded from the 1975 edition of Tariff Manual No 4 in connection with the merging of the Termez and Termez-Port stations on the Central Asian Railroad into one station, Termez. The Termez station code of 78650 is being retained; the code for export is 78700. The Termez station is 12 kilometers from the national border. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

KUYBYSHEV RAILROAD STATION CHANGES--The Tyulgan station on the Kuybyshev Railroad is being opened for freight operations in accordance with Sections 1, 2 and 4, but the Vladimirskaya station on the same railroad is being closed for freight operations in accordance with Sections 1 and 2 of Tariff Manual No 4. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

NORTHERN RAILROAD STATIONS UPGRADED--The Malakhovskaya and Pelgusovo stations on the Northern Railroad are being opened for receiving and dispatching freight in carload and small-sized consignments, with loading of entire cars on sidings and at locations not generally utilized, that is, in accordance with Section 3 of Tariff Manual No 4. [Text] [Moscow GUDOK in Russian 23 Jul 86 p 2] 8936

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MARITIME AND RIVER FLEETS

NEW MAURICE BISHOP-CLASS OIL TANKER PROFILED

Moscow MORSKOY FLOT in Russian No 3, Mar 86 pp 44-49

[Article by L. Dvorovenko, chief of the Technical Department of the Latvian Shipping Company: "The 'Maurice Bishop' Tanker"]

[Text] The Latvian Shipping Company has begun to be replenished with new Maurice Bishop-class vessels designed to transport petroleum, petroleum products, methanol, and other chemical cargo in bulk. These vessels are being built in Yugoslavia according to regulations and under the observation of the USSR Register of Shipping, taking into account the requirements of international conventions and national rules for the class KM L2 A1 (tanker).

Basic Characteristics

Length:	
Overall	151.5 m
Between perpendiculars.	142.6 m
Extreme beam	22.4 m
Hull height.	12.1 m
Loaded draft	9.0 m
Dead weight at draft of 9.0 meters	16,400 t
Displacement at draft of 9.0 meters.	21,951 t
Tonnage:	
Gross	10,944 reg. tons
Net	5,885 reg. tons
Speed.	15.1 knots
Cruising range	12,000 miles

The new tanker is a single-screw, single-deck diesel ship with a bulb bow, transom stern, tank, an aft engine room, and a 5-tier superstructure for berthing and working spaces.

The vessel has a welded hull with a combination framing system. It has a solid inner bottom over the entire length of the hull between the forepeak and afterpeak bulkheads. The cargo space is divided by hermetic longitudinal and transverse bulkheads into six center and five side tanks (on each side) with a total capacity of 20,480 cubic meters. Side tanks Nos 3 and 4, with a total capacity of 2,959 cubic meters, are also adapted for clean ballast.

In accordance with the requirements of the MARPOL-73/78 International Convention, the vessel has two side settling tanks with a total capacity of 452 cubic meters. The between-bottom space under the cargo tanks is divided by bulkheads into eight tanks intended for insulating ballast.

All the cargo settling tanks, pipelines, and other structures in them have an anticorrosive protective coating resistant to the effects of methanol and other chemical cargo authorized for transport in the vessel by the USSR Register of Shipping. The protective coating on the lead vessel is a zinc-silicate paint from the firm International Paint; on other vessels of this series it is Dimecoat paint produced by the firm Ameron. The surface of the between-bottom ballast tanks is protected against corrosion with epoxy paint.

The configuration of the cargo handling system makes it possible to accomplish cargo operations with four kinds of cargo simultaneously and also provides for the possibility of batch cargo handling at various ports. Each cargo tank is equipped with an individual submersible cargo pump with a capacity of 250 cubic meters per hour at a pressure of 90 meters of water column. All 16 cargo pumps are the type SK-150 produced by the Norwegian firm Eureka--centrifugal vertical pumps driven by high-pressure BPR 260 TSF hydraulic pumps which are installed at a station located in the engine room. In the event the cargo pump becomes inoperative, there is a portable submersible hydraulic-drive pump with a capacity of 70 cubic meters per hour at a pressure of 90 meters of water column.

The tanks take on cargo through cargo pumps; intake and discharge of cargo are possible through the aft line. The maximum capacity of the cargo system when simultaneously loading all tanks is 3,000 cubic meters per hour; when unloading cargo with a density of 0.8 tons per cubic meter, it is 1,750 cubic meters per hour. The tanks are cleared using cargo pumps.

The cargo being transported is heated up by circulating it using the cargo pumps through heaters operating on saturated steam at a pressure of 0.6 MPa. Each cargo pump is coupled with its own heater with a heating surface of 14 square meters installed on the upper deck. The heating system makes it possible to increase the temperature of cargo with a viscosity of 3,500 on a Redwood 1 at 100 degrees F from 25 to 65 degrees C in the course of 8 days with an outside air temperature of -25 degrees C and outside water temperature of -2 degrees C and also to maintain the temperature of the cargo in the tanks at 55 degrees C under these external conditions.

Each cargo tank is equipped with an independent ventilation valve which activates when the allowable pressure in the tanks changes. The vessel has two portable fans with a capacity of 6,000 cubic meters each for degassing the tanks.

The vessel's ballast system includes a CGC 150Y48 PMB hydraulic-drive vertical centrifugal ballast pump with a capacity of 280 cubic meters per hour at a pressure of 2.5 bars servicing the between-bottom tanks of insulating ballast. The pump is installed in the aft pump room and is also used for ballasting side tanks Nos 3 and 4 intended for clean ballast. Unballasting of

the side tanks is accomplished by the cargo pumps. A hydraulic centrifugal drainage pump with a capacity of 90 cubic meters per hour is installed in the aft pump room for clearing the between-bottom insulating ballast tanks. Ballast operations in the forepeak are provided by a CGB 80Y48 PMB hydraulic vertical centrifugal pump with a capacity of 60 cubic meters per hour installed in the fore pump room.

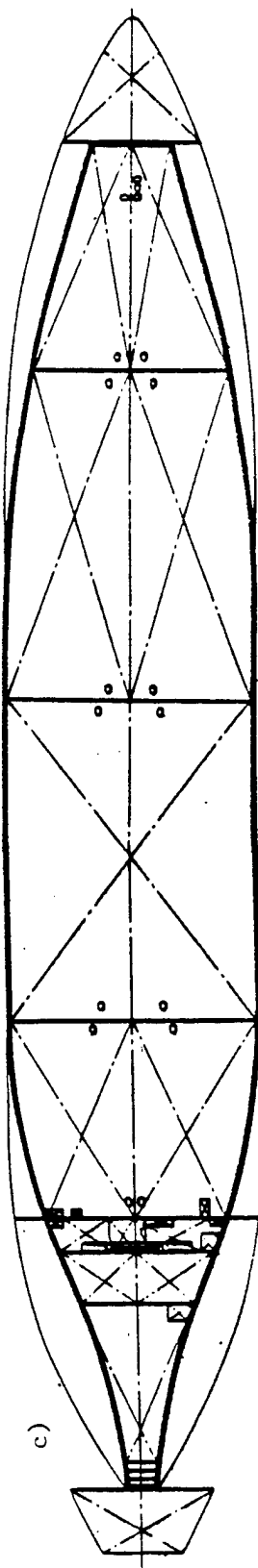
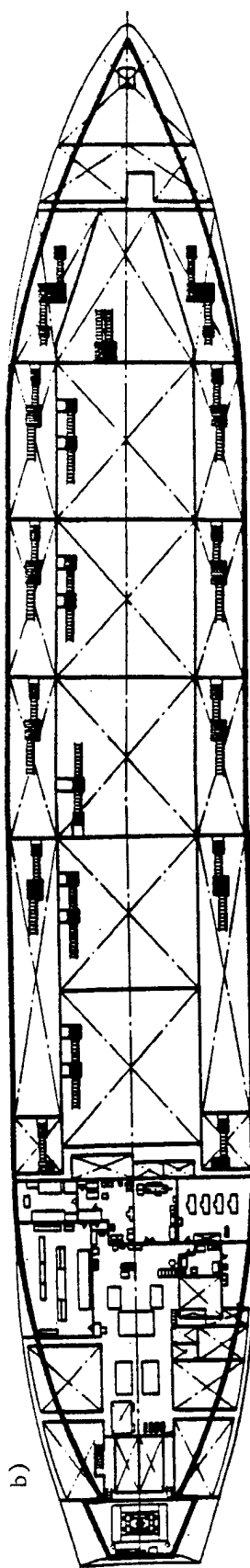
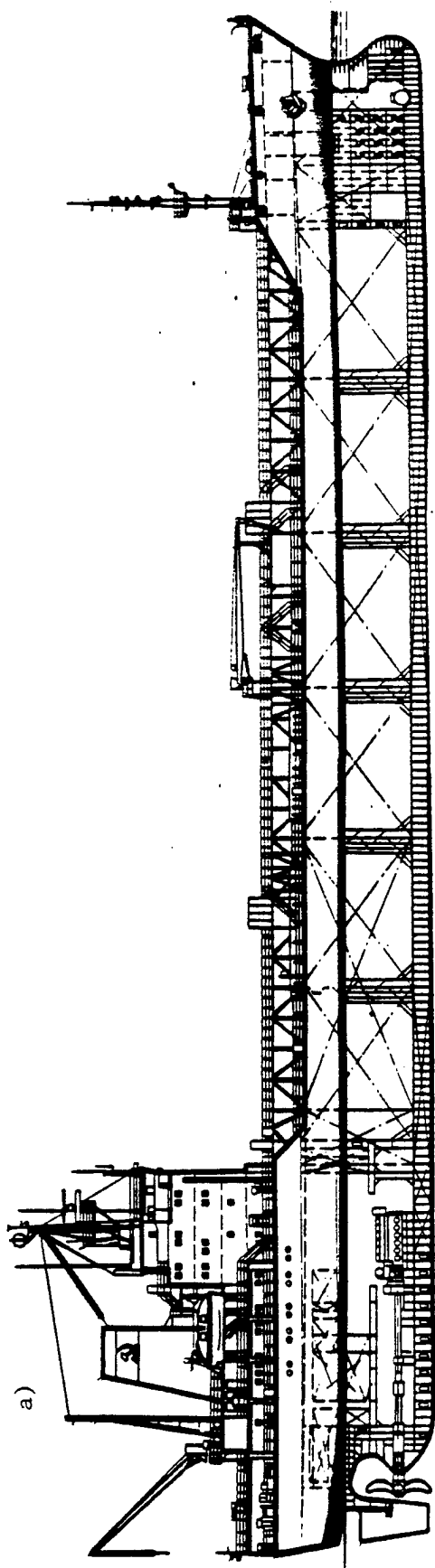
Cargo and ballast operations on the vessel are automated. The cargo and ballast pumps and accessories of the cargo system are controlled remotely from the cargo operations control station [PUGO] located in the superstructure on the poop deck. The PUGO has a cargo operation control console with instruments for checking pressure in the cargo pipeline and the hydraulic cargo and ballast operations remote control system. Execution of the control instructions is monitored on a mimic panel indicating the position of the valves and gates. The PUGO also has instruments for monitoring the remote-controlled measurement and indication of the level of cargo in the tanks, done with the aid of radar sensors of the SUM-21 system produced by the firm SAAB Marine (Sweden), and remote-controlled "Bergan" (USA) temperature recorders from heat sensors installed at two heights in each tank. The COCS has indicators of the vessel's forward and aft draft.

The tanks are washed by with outside water by using portable rotary-type washing machines. When preparing the tanks for transporting methanol and certain other chemical cargo, the tanks are rinsed with fresh water. The settling tanks, interconnected by an overflow pipe, form a two-stage washwater sediment system. There is an N400/2500 heater for heating up the wash water. It has a heating surface of 40 square meters and a capacity of heating 90 cubic meters of seawater per hour from 20 to 80 degrees C at a steam pressure of 0.8 MPa. The washwater heating temperature is controlled automatically. The tank-washing system includes cargo pumps and a CGB 80Y48 hydraulic vertical centrifugal washing pump with a capacity of 90 cubic meters per hour at a pressure of 90 meters of water column. It is possible to use the hydraulic vertical centrifugal drainage pump as a backup pump in the washing system, having a capacity of 90 cubic meters per hour.

The settling tanks are equipped with a system for discharging oil-bearing water to floating or stationary purification works. Water being dumped overboard from the settling tanks is monitored by using an ODMES 663 system for automatic measurement and monitoring of waste control, made by the French firm Seres and located in the PUGO. When the oil content in the water being dumped exceeds the norm, the system automatically returns it to the settling tank.

A TEF 2.5-S separator, made by the firm Tibo-3 May, is installed for purification of bilge water accumulating in the process of operation in the engine room.

The vessel's waste water system has an ST4 Super Trident plant for biological treatment and disinfection of waste water, made by the British firm Hamworthy.



General layout of vessel: a-side view; b-space above upper deck; c-double bottom.

The vessel has a Saniterm SH-20SR incinerator, produced by the firm Tibo-3 May, for burning garbage and fuel and oil separation waste. The incinerator's capacity is 30 kg per hour of liquid and 40 kg per hour of solid waste.

Fire protection on the vessel is provided by several systems. The water fire extinguishing system includes two YKY 6 am 30-12.5/5 centrifugal pumps, produced by the firm Yugoturbina and having a capacity of 110 cubic meters per hours at a pressure of 11 bars, and a CGA 50Y48 emergency centrifugal horizontal pump with a capacity of 40 cubic meters per hour and with hydraulic drive from a diesel installed in the forward pump room.

The steam-smothering system is intended for protection against fires in fuel tanks, cofferdams, exhaust manifolds of the main and auxiliary engines, and boiler uptakes.

The main fire protection system extinguishes fires in tanks and on deck with medium-expansion foam. Installed at the foam-quenching station are two tanks with a capacity of 2 cubic meters each for the foaming agent, a mixing pump, and an automatic metering pump for obtaining a 6-percent foaming emulsion. When transporting methanol and other chemical cargo, the foam-quenching system uses an alcohol-resistant foaming agent such as "light water" or "polydol."

The engine room is equipped with additional effective firefighting equipment, the operating principles of which involve dispersing the extinguishing substance Halon-1301 into the room being protected. Cylinders with sprayers are filled with this colorless, odorless gas under pressure and positioned in the engine room at locations where fire is most apt to break out.

The vessel is equipped with an automatic S-300 fire-alarm system produced by the Swedish firm Salen and Vikander; in case of fire, it emits light and audible signals.

For anchoring and mooring operations, the vessel is equipped with two hydraulic windlasses, coupled with NHS-1-5643P100 automatic mooring winches, and two NHP-200 hydraulic mooring winches made by the SFRY.

The anchor arrangement is remote-controlled from the wheel house. Anchor cable indicators are located in the area of the anchor arrangement control station and in the wheel house, where there is also an automatic control for the speed of casting the anchor. The ground tackle meets the requirements of rules of navigation through the Suez, Kiel, and Panama canals.

Survival equipment consists of two 40-man fiber glass tanker powerboats, four inflatable 10-man rafts, a 6-man raft, and a work powerboat.

The steering arrangement consists of a streamlined semibalanced rudder controlled by a KS4K360 electrohydraulic steering engine with two pump units, made by the firm Vulcan (SRFY). The steering arrangement is remote-controlled from the wheel house and locally controlled from the steering room. There is automatic control of the steering arrangement by using automatic course-keeping gear. Rudder angle indicators are installed in the wheel house on the bridge extensions, the steering room, and the central control room.

To increase the maneuvering qualities of the vessel, it is equipped with a bow thruster with a controllable-pitch screw driven by a 367kW electric motor. The thruster is equipped with a system of automatic protection of mechanisms, with parameter monitoring instruments and light and audible alarm warning signalling to the central control room, the wheel house, and the bridge extensions.

The vessel's main propulsion plant consists of two 6PC-2.5L-400 medium-rpm 6-cylinder nonreversible four-cycle turbocharged engines manufactured in the SFRY under license from the firm SEMT Pielstick. The engines operate on heavy fuel with a viscosity of up to 3500 on the Redwood 1 at a temperature of 100 degrees F, each developing a continuous power of 2.87 MW (3,900 hp) at 520 rpm. The engines are connected to a 2EPMH300 reduction gear, made by the French firm Citroen, by means of friction clutches from the Austrian firm Gelsinger. The reduction gear drives the propeller (85 rpm) and two shaft generators (1,500 rpm). With such equipment, the propulsion plant possesses an increased reliability, ensures effective maneuverability of the vessel, and saves diesel fuel during cargo operations. When operating one main engine in the normal mode, the vessel's speed is 10 knots.

The controllable-pitch propeller is 6.3 meters in diameter, has four detachable blades, and is made of a high-strength bronze alloy. The stern tube of the propeller shaft is equipped with MK-11 gland packing made by the firm Vaukesha Lips.

The vessel's electric power plant includes two S8204K3009 brushless self-excited shaft generators made by the firm Ulyanik (SFRY) rated at 1,700 kVA each (400 V, 50 Hz) at 1,500 rpm and two S8168K3096 brushless self-excited generators rated at 640 kVA (440 V, 50 Hz) driven by 5ASL25D engines made by the firm Yugoturbina rated at 570 kW (670 hp) at 750 rpm. The power of one shaft generator is sufficient to meet the vessel's electrical needs while underway (for heating cargo or washing tanks, during ballasting at sea), in the maneuvering mode with operation of the forward thruster, and for carrying out cargo operations. Parallel operation of the shaft generators is not possible. Parallel operation of a shaft generator and the diesel generator is permitted only for a short period.

As an emergency electrical power source, the vessel has an S8034-K3027 generator rated at 100 kVA (400 V, 50 Hz) driven by a 2FP631A diesel produced by the firm Famos (SFRY) rated at 90 kW at 1,500 rpm. The emergency diesel generator starts automatically when current is cut off from the main switchboard. The auxiliary and emergency engines run on diesel fuel.

The boiler plant consists of two K1P/GC automated heat-recovery boilers made by the firm TPK (SFRY), having a steam output of 650 kg per hour each at a pressure of 0.8 MPa, and two auxiliary vertical water-tube steam boilers with a steam output of 6 tons per hour each at a pressure of 0.6 MPa. The auxiliary boilers are equipped with automatic devices controlling the flow of fuel depending on the load.

There are two W110 main electric two-stage piston compressors made by the firm Split-Hatlapa to satisfy the need for compressed air on the vessel. They have a capacity of 60 cubic meters per hour each at a pressure of 3 MPa. For housekeeping needs there is also a W140 compressor with an capacity of 160 cubic meters per hour at a pressure of 0.8 MPa and an electric two-stage piston emergency compressor with a capacity of 30 cubic meters per hour at 3 MPa. There is a special compressor made by the firm Bauer for charging the cylinders of the ASV-2 insulating respirators used by crew members when working in closed areas when transporting chemical cargo.

Fresh water supplies are replenished by an automated vacuum distilling plant with a capacity of 20 tons per day.

The refrigerating plant, servicing seven provisions chambers, includes two Bittser-U piston compressor units made by the firm York-Termofrits with a cooling capacity of 7,240 kilocalories per hour. The air conditioning system for the berthing and work spaces includes an 8XXF88 compressor made by the firm York-Termofrits with a cooling capacity of 24,500 kilocalories per hour and two fans made by the Swedish firm AB Svenska with a capacity of 7,380 cubic meters per hour.

Two independent NSN3 conditioners made by the firm Bonswerke-Refak (FRG) are installed for the central control room and engine room workshops. Their cooling capacity is 10,000 kilocalories per hour.

Equipment for automation of control and monitoring of operation of the propulsion plant, auxiliary mechanisms, and ship systems, corresponding to the A1 automation class under the USSR Register of Shipping Rules, makes unmanned operation of mechanisms in the engine room possible for 16 hours a day under normal operating conditions when underway and around the clock when at anchor.

The main engines, reduction gear clutches, variable-pitch propeller, and shaft generators are controlled by means of an FAMP-S electropneumatic automatic remote control system made by the firm ACEA (Sweden). The automatic remote control system has two control programs: one for maintaining a constant rotational speed of the main engine and a combinatorial program providing for simultaneous adjustment of the main engine rotational speed and the propeller pitch. When connecting the shaft generator to the bus of the main distribution board, control of the vessel's movement is accomplished only by changing the propeller pitch. The variable rotational speed mode of the main engine is possible when generating electrical power by the auxiliary diesel generators, which are equipped with a GENA-S automatic remote control system produced by the firm ACEA. The system accomplishes the following: regulation of the rotational speed of the diesel generators; automatic starting and connecting of one diesel generator to the main distribution board buses when current is cut off from it; automatic start, synchronization, and connecting of the backup diesel generator to the buses in the event of an emergency signal from the on-line shaft generator, disconnecting nonessential users and the shaft generator; automatic start, synchronization, bus connection, and acceptance of the load by the backup diesel generator when the on-line diesel generator is overloaded; automatic start, synchronization, and connection of the backup diesel generator if the on-line diesel generator has a drop in oil

pressure or a rise in the temperature of cooling water and subsequently goes off line; control of the backup diesel generator's oil circulation pumps; automatic disconnect of the shaft generator's automatic generator circuit breaker at low voltage and speed.

An emergency warning system manufactured at the Rade Konchar enterprise (SFRY) monitors the operating parameters of the propulsion plant. The system is equipped with an automatic recorder which records parameter changes. Upon emission of an alarm signal, the main engine throttles back for the 3 seconds necessary for setting the propeller blades to the zero position.

A system of automatic and remote-control starting of mechanisms in the engine room provides for remote-control starting of the mechanisms from the central control room and automatic starting of backup mechanisms in case the primary ones malfunction. Upon restoration of power after a cut-off of the vessel's current, the system provides for sequential starting of the primary mechanisms operating before the cut-off.

Correlated signalling on the operation of mechanisms in the engine room terminates in the wheel house, the engineers' cabins, the wardroom, and the crew's mess.

The vessel is equipped with modern electronic radio navigation aids ensuring safe navigation and continuous ship-to-shore communications. The vessel has a Magnavox (USA) satellite navigation system, a position-fixing system, two radars, automatic course-keeping gear, a printer, radio telex, radio transmitters, radio sets, and other electronic radio navigation aids.

The superstructure has berthing spaces for 35 crew members, 4 trainees, and the pilot. The crew members are accommodated in single-berth cabins, the trainees in double-berth cabins. A block of cabins is set up for senior command personnel. The vessel has a medical section, rooms for individual activities, recreation spaces, an athletics room, a sauna, and a swimming pool. The configuration and finishing of the berthing and work spaces take into account modern requirements providing normal conditions for the crew's work and rest.

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MARITIME AND RIVER FLEETS

GLAVFLOT CHIEF ON LO/RO SHIP OPERATIONAL POTENTIALS

Moscow MORSKOY FLOT in Russian No 4, Apr 86 pp 17-19

[Article by V. Zbarashchenko, chief of the Shipping and Operation of the Fleet and Ports Main Administration, Ministry of the Maritime Fleet, and member of the Ministry of the Maritime Fleet Collegium: "For the New Fleet--Intensive Processing"]

[Text] The "Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and for the Period Out to the Year 2000" say: "Achieve an improvement in the intensification of production based on the widespread use of scientific and technical achievements, the implementation of progressive changes for the better in the structure and organization of production, and an increase in labor, technological and state discipline."

In order for the complex national economic mechanism to operate continuously and accurately, the transportation branches must be rapidly developed and raised to a new technical level. Sea transport is a highly developed branch capable of solving the most important questions in the transportation satisfaction of the national economy's requirements and the country's foreign trade.

We have a fleet for this, which has been constructed based on the latest achievements in scientific and technical progress. Large mechanized transshipping complexes and a powerful ship repair base have been constructed in ports. The forms and methods for operating and servicing the fleet are being improved.

At the present time, the main task is to achieve the best results in the operation of the fleet and to insure stability in shipments with the least expenditures of material, financial and labor resources.

The improvement in the use of the fleet -- especially the new generation of large tonnage, specialized and icebreaker transport vessels -- and sea ports require a new and higher level of organization of the transport process. To a considerable degree, this pertains to vessels of the LO/RO type which have

arrived in recent years in the Black Sea, Baltic, Far Eastern, Murmansk, and Sakhalin shipping companies. The technical features of these vessels permit the conducting of cargo operations to be organized with high efficiency. The fact of the matter is that their design provides an opportunity to use roll-on and vertical cargo operation technologies simultaneously. The presence on them of powerful cargo equipment and angled ramps on the tweendeck deck combined with the maximum opening of the holds and the optimum configuration of the cargo area creates conditions for the effective transportation and transshipment of cargo in bags, blocks and high tonnage containers and also of all types of self-propelled trailer equipment and roll-trailers. LO/RO-type vessels can be received and effectively handled at both special and standard berths. It is natural that these vessels are more capital-intensive than universal ones.

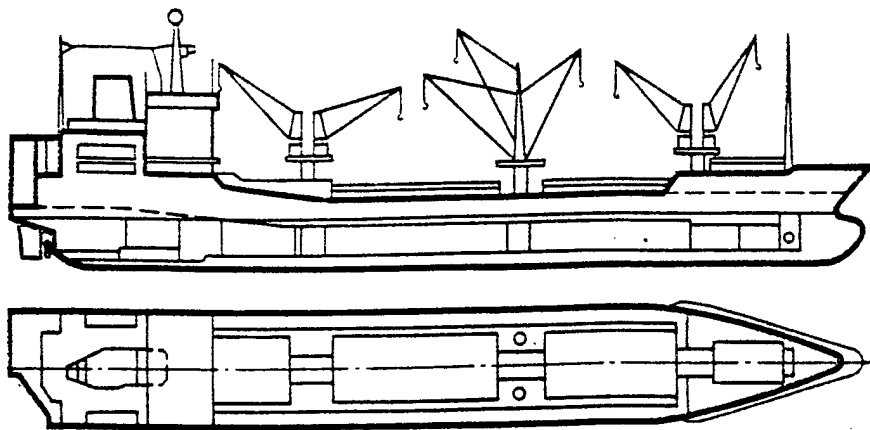
Icebreaker-transport vessels of the Norilsk type (Far Eastern, Murmansk and Sakhalin shipping companies), of the Astrakhan type (Baltic and Black Sea shipping companies) and of the Izvestiya type (Black Sea Shipping Company) are related to the mentioned vessels (cf. fig). The replenishment of the fleet with LO/RO-type vessels will continue during the 12th Five-Year Plan. Their technical and operating characteristics, which are given in the table, and the optimality of their parameters foreordain the replacement of a significant portion of the traditional multipurpose dry-cargo fleet with them.

It is necessary to point out that the high cost of LO/RO-type vessels can and must justify itself only during their operation as specialized vessels attached for operations on consecutive trips with steady freight traffic.

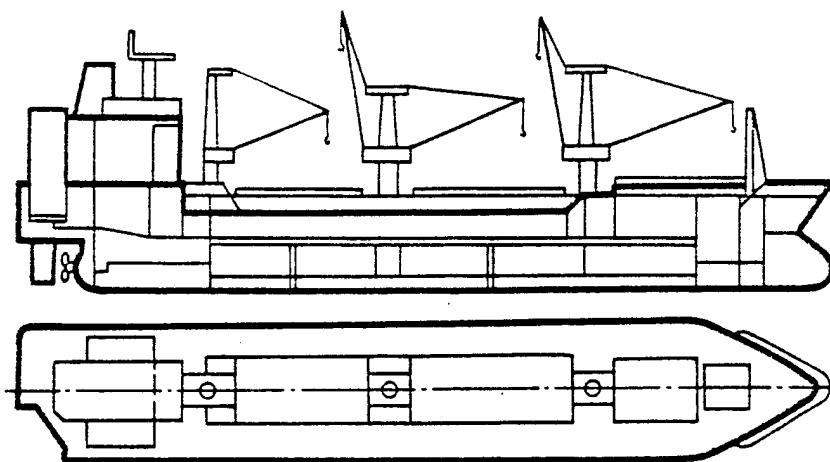
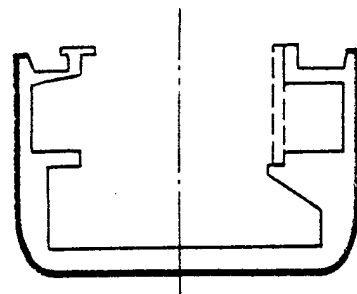
Whereas the average balanced cost of one dead-weight ton of universal vessels constructed during recent years (of the Varnemyunde, Geroi Panfilovtsy and 50 Years of the Komsomol type) is located within the range of 430 to 830 rubles, the cost of one dead-weight ton of Astrakhan-type vessels is equal to 1,300 rubles and that of the Norilsk-type vessels is approximately 2,000 rubles in connection with its increased icebreaking capability.

LO/RO-type vessels possess a high degree of universality. This puts into the hands of the operating staff of the shipping companies and ports broad opportunities to organize their use in a highly effective manner for shipping practically an unlimited list of freight with a sharp increase in the labor productivity of the sailing crew and the dockers. Unfortunately, there are quite a few interruptions here. The uniqueness of the technological and navigational capabilities of the new fleet is not always taken into consideration although the specific cost of one ton of carrying capacity on these vessels requires high efficiency, an operationally sound system of operating, the preparation of each batch of cargo for the arrival of the vessel in the loading port, and the elimination of nonproductive idle time.

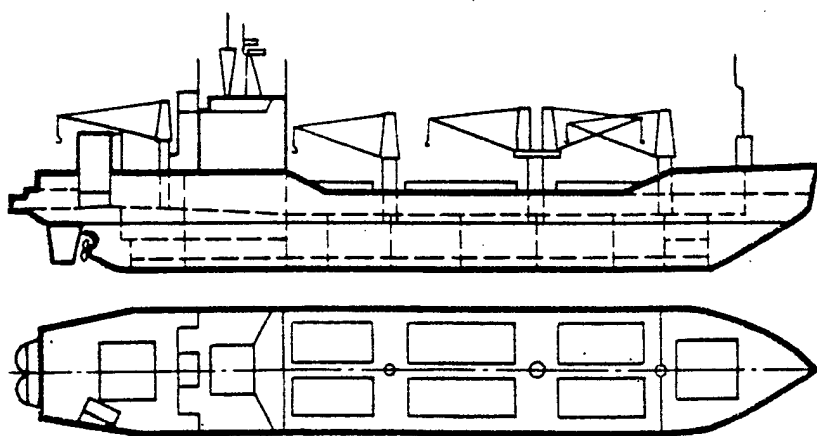
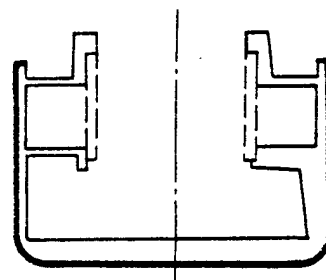
It is sufficient to say that, when loading Norilsk-type vessels with arctic cargo of the most diverse variety with a good organization even under the conditions of the arctic port of Pevek, they managed to achieve a rate of cargo operations of approximately 4,000 tons per vessel per day. It is in accurate organization that one of the important factors in highly remunerative activity



Astrakhan-type vessel



Izvestiya-type vessel



Norilsk-type vessel

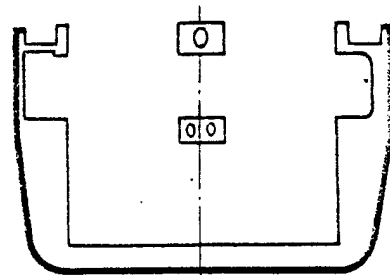


Table 1. Main Technical and Operating Characteristics of Astrakhan, Izvestiya and Norilsk Type Vessels

<u>Characteristic</u>	<u>Astrakhan</u>	<u>Izvestiya</u>	<u>Norilsk</u>
Greatest length, meters	173.5	132.46	173.5
Greatest width, meters	23.05	20.5	24.0
Greatest draught, meters	10.02	9.34	10.5
Deadweight, tons	17,850	12,600	19,942
Carrying capacity, tons	15,987	11,382	15,648
Speed, knots	15.3	15.4	17.0
Class on USSR Register	KM0L2A2	KM0L3A2	KM0ULA2A2
Capacity of the vessel, cubic meters			
Baled	25,680	20,545	25,300
Bulk	20,440	22,180	31,185
Capacity of the roll-on deck for roll-trailers (DFE-- 20-foot equivalent)	90	-	90
Cargo equipment, unit X tons:			
Booms	2 X 25 1 X 12.5	-	-
Cranes	4 X 12.5	3 X 12.5 2 X 35	3 X 20 2 X 40
	Stern angled ramp, passage 5.8 meters wide and 4.5 meters high	Stern angled ramp	Stern angled ramp, passage 5.0 meters wide and 4.3 meters high

is concealed. The use of LO/RO-type vessels must take place on definite and permanent cargo avenues with timely and careful preparation of not only the fleet but also the shore transportation and technological system that has been formed, including the development of optimum standard cargo plans, the preparation of the appropriate collection of freight before the vessel's arrival in port, and the coordination of cargo operation equipment and the appropriate selection of technological equipment in the correspondent ports.

In other words, having created conditions for making the work easier, the new fleet has moved to the forefront requirements of an engineer nature on the operating staff at literally all levels and, of course, those on vessel crews. Successful work is impossible without their knowledge of the navigational and technological capabilities of the specialized vessels.

The maximum rate in handling LO/RO-type vessels can be achieved by combining for a time horizontal and vertical cargo operation technologies, that is, after loading holds with cargo having a high specific gravity, including bags or blocks, it is necessary to begin the simultaneous loading of the tweendeck and upper decks using the stern ramp to roll the self-propelled tractor equipment or freight on roll-trailers onto the tweendeck and the shore or ship cranes to deliver containers, metal work or oversize equipment to the upper deck.

In order to make better use of the lifting capacity of ship and shore cranes and to improve the rate of cargo operations, the loading of holds on LO/RO-type vessels must be done only with packaged freight which has been formed into blocks using universal 20-foot flats (large tonnage pallets) and other consolidation systems.

It is necessary to take into account the fact that large tonnage pallets permit standard container spreaders to be used in the construction. For example, six bags on universal wooden pallets with dimensions of 1,200 x 1,600 (1,800) millimeters can be placed on each of these pallet-flats even in one tier. This immediately provides an increase of up to 12-15 tons in the utilization of a crane. It is advisable to stow the packages, which have been formed on these pallets, in the below-deck spaces of the holds using fork hold-loaders. Within the limits of the hatch opening, it is effective to stow packages in packaging slings in the cargo area (without below-deck spaces). In this case, a crane using standard crane suspension can transship those same six packages each weighing up to 2.5 tons.

The formation of block packages can be accomplished with the help of lift trucks immediately by the vessel or in the warehouse with their subsequent movement on a trailer to the ship's side, and the taking apart and compact stowing -- in the hold using three-seven-ton electric loaders or lift trucks with their exhaust gases neutralized. The loading must be completed with some undisassembled blocks in order to insure rapid access to the cargo in the unloading port.

The main traffic lanes, on which LO/RO-type vessels can be used with maximum effectiveness, are primarily determined by the areas of operation of our shipping companies on the most stable routes. It is necessary to regard the Cuban route from Ilichevsk and Leningrad as the main one for Astrakhan-and Izvestiya-type vessels. This permits the delivery of cargo in containers and bags to be assured not only to Havana but also to a number of other Cuban ports that are not prepared to receive cell container carriers and RO/RO of the Kapitan Smirnov type because of their technical and navigational capabilities. In turn, the spreading of the cargo traffic to several Cuban ports lowers the strain on the surface types of transportation in Havana and permits vessels to be handled more intensively in this port. The return cargo can be Cuban export freight (sugar in bulk or in bags, ore concentrates, cargo in containers, and citrus plants) or grain from U. S. and Canadian ports.

The traditional routes for transporting national economic freight are the most effective for Norilsk-type vessels: Murmansk-Dudinka-Murmansk, Vanino-Magadan, Leningrad-Pevak, and Vladivostok-Pevak. Thanks to their high ability to travel through ice, the navigation periods (from May to October) to the port of Pevak can be significantly increased (up to six months) and thus, preconditions for preventing the bunched-up arrival of vessels in the port during the period of arctic navigation (July-September) to be created. Along with the above-proposed technological solutions that are aimed at sharply increasing the rate of cargo operations, this will provide an opportunity to bring the gross rate of handling the mentioned vessels to 4,000 tons a day.

An analysis of the trips that have been made permits the conclusion to be drawn that the required economic effect from the operation of Norilsk-type vessels can be assured with such a loading and unloading rate. The results of the test trip by the Kola motor vessel in 1985 from Leningrad to Pevek, where the loading of the vessel in the port of Leningrad was carried out with a gross rate of 1,700 tons per vessel per day and the 7,212 tons of cargo were unloaded in the port of Pevek in 54 hours-- this corresponds to a rate of 3,244 tons per vessel per day -- testifies to this.

Unfortunately, the operating staff in a number of shipping companies have approached LO/RO-type vessels with the yardstick adopted for organizing the operations of universal vessels without making use of the capabilities for their intensive handling in ports based on making complete sets of consignments with the necessary consolidation of spaces and the use of advanced machine-tool attachments and equipment for vessels and ports.

The plan for measures to improve technologies for shipping general cargo and for increasing the intensity in handling LO/RO-type vessels and the work schedules for preparing the machine-tool attachments and equipment for the new technologies for transporting freight in these vessels, which have been developed by the Shipping and Operation of the Fleet and Ports Main Administration, have been sent to the shipping companies and other subunits of the Ministry of the Maritime Fleet. Now the task is for the TsNIIMF [Central Scientific Research Institute of the Maritime Fleet], Lenmorniiprojekt [Leningrad Branch of the State Design and Scientific Research Institute for Maritime Transport], the Baltic TsPKB [Central Design Bureau], the Morstroyzaganpostavka [Maritime Construction for Overseas Deliveries] All-Union Association, and the Black Sea, Baltic, Murmansk and Far Eastern shipping companies to take urgent steps to realize these measures. During May-June 1986, test shipments of cargo must be conducted on the most important routes, and the necessary conditions for accelerating the handling of vessels in ports no less than twofold when compared with the actually achieved results in 1985, must be created.

In this regard, it is important to point out that the time frames of the plans for introducing the measures should be strictly observed. Today, one cannot allow old yardsticks where innovations were introduced into practice after five-six years. This distance must be crossed much more rapidly. The cooperation between science and practice must not be in words but in deeds, and the end results of labor be the indicators of common effort. As an example, I would like to point out the useful participation of the branch laboratory at the LVIMU [Leningrad Higher Engineer Naval School imeni Admiral S.O. Makarov] in the preliminary measures to develop and incorporate intensive technologies into cargo operations on Norilsk-type vessels. The duty of all shore subunits is to be imbued with a continuous sense of responsibility for the intensive processing of the specialized fleet. At the same time, it is necessary to conduct the appropriate training of the crews for the new vessels. Their highly efficient operation depends on each sailor-- from the captain to the ordinary seaman.

This article has pointed out how the effectiveness in using vessels of only one type -- LO/RO-- can and must be increased. It seems necessary that advanced transport and technological systems for using the fleet be developed and incorporated in the shipping companies, on the vessels and in the ports with the active help of scientific and design organizations. All of these measures will help to carry out successfully the tasks that have been posed to the branch by the decisions of the 27th CPSU Congress.

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MARITIME AND RIVER FLEETS

NUCLEAR-POWERED ICEBREAKER ROSSIYA PROFILED

Moscow MORSKOY FLOT in Russian No 4, Apr 86 pp 46-52

[Article by V. Demyanchenko: "The Nuclear-Powered Icebreaker Rossiya"]

[Text] The Rossiya nuclear-powered icebreaker was constructed in Leningrad in 1985 in the Baltic yard-- the first in a series of arctic nuclear-powered icebreakers with a power of 55.1 megawatts (75,000 horsepower) with a corrected design. The commissioning of the fourth nuclear-powered icebreaker was another step in the realization of our program to expand navigation in the Arctic.

More than 10 years have passed since the commissioning of the first nuclear-powered icebreaker in the Arktika class (now the Leonid Brezhnev); the second icebreaker -- the Sibir -- has been operating for eight years. During the years that have passed, a great deal of experience has been accumulated; the capabilities of nuclear-powered icebreakers have been checked under different conditions; and the tactics for their use, questions concerning base maintenance and the training of the required specialists, and other practical aspects in the operation of vessels with nuclear power plants have been worked out. The appearance of nuclear-powered icebreakers on the North Sea route and their successful operation have provided a powerful impulse to the further development of the transport fleet which corresponds to a great degree to the capabilities of nuclear-powered icebreakers under the conditions of pilotage through the ice.

The successful testing of the operation of second generation nuclear-powered icebreakers has completely confirmed the technical advisability and effectiveness of the main designer solutions for an icebreaker in general and for its most important parts. Along with this, during the period that has passed from the time nuclear-powered vessels began to be built, a great deal of experience has been accumulated in their operation; research to improve several units and elements on icebreakers further has been carried out; and new models of equipment have been created. During this time, several requirements in the USSR Register Rules have been made more precise, the requirements of new international conventions have come into effect, and branch standards have been reviewed. New factors, which have a negative effect on the capability to travel through ice, are being revealed during the winter navigation period. This has

required the implementation of additional designs. The fact that the Rossiya icebreaker must be better suited for winter navigation under polar night conditions has also had an important significance.

All of this led to the need to correct the design and this was done in accordance with the technical specifications of the Ministry of the Maritime Fleet.

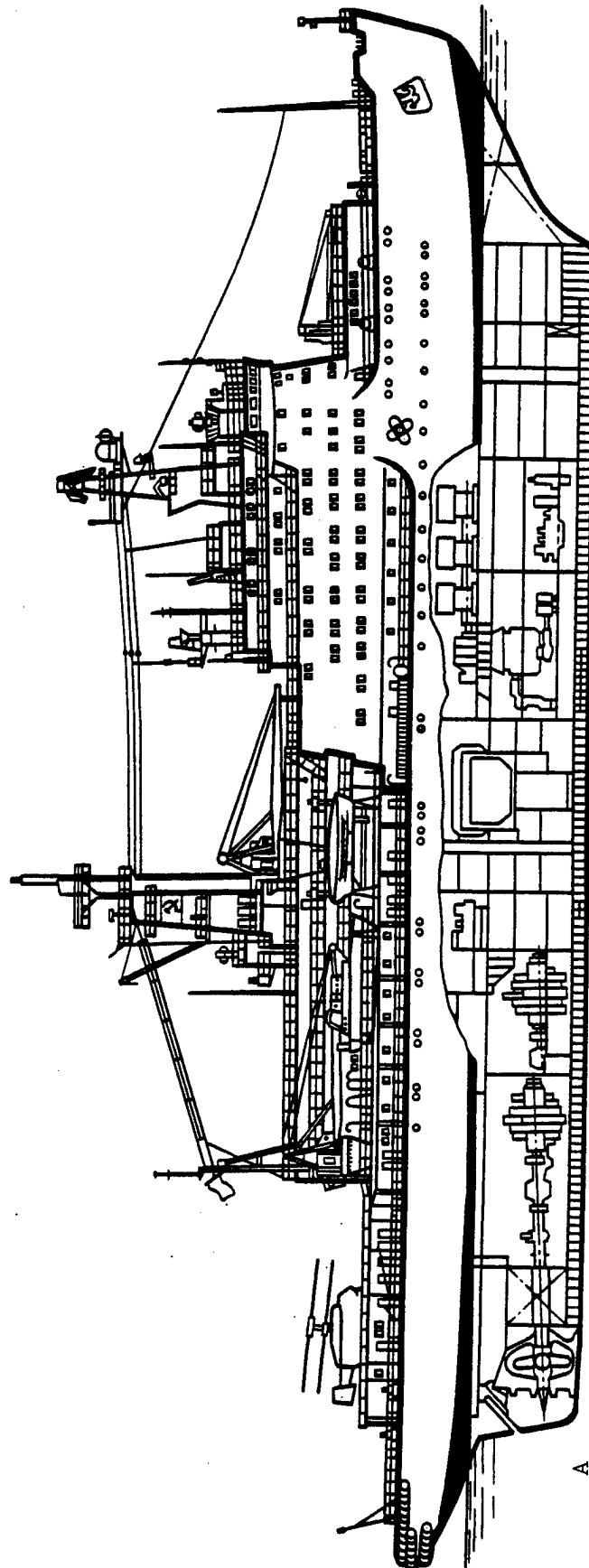
The Rossiya icebreaker was constructed in accordance with the USSR Register Rules and under its technical supervision for a class KM 0 [2] icebreaker [X] and satisfies the requirements of the International Convention To Protect Human Life on the Sea (SOLAS-74 [expansion unknown]), the 1966 International Convention on Load Marking and the International Convention on Preventing Pollution From Vessels (MARPOL-73/78 [expansion unknown]); it also satisfies national rules, norms and requirements. The main purpose of the icebreaker is to lead vessels under the icy conditions of the Arctic while carrying out all types of icebreaker operations. Based on its type, the Rossiya icebreaker is a three-shaft nuclear-powered turbo-electric vessel with a redundant freeboard, four decks, a forecastle, and a well-developed five-tier superstructure.

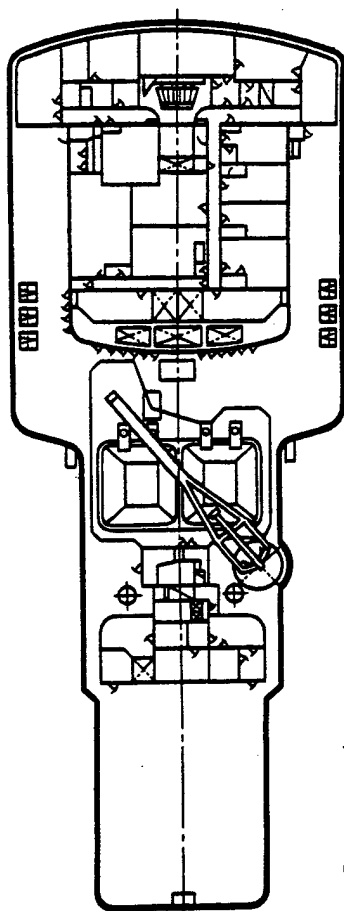
Operating nuclear-powered icebreakers have well proven themselves under the diverse conditions of the Arctic, operating equally successfully both in solid shore ice fields of great extent and in whipped hummocked and compressed ice fields. This testifies to the rather successful form of the hull's lines and to the satisfactory relationship between power and displacement. In connection with this, the main dimensions and shape of the hull on the Leonid Brezhnev and Lenin icebreakers have been maintained for the Rossiya icebreaker.

The overall lay-out of the icebreaker was done according to the schematic that has become traditional for nuclear-powered icebreakers: the central area was set aside for locating the nuclear-powered steam-generation plant (APPU); the main turbo-generator (GTG) and forward electric power plant compartment is located forward of this; the provision and galley unit, the main distribution board No 1 (GRShch-1), the freshwater tank, the area for the turbo-supercharger and deicer device, etc., are located behind the GTG compartment. The aft electric power plant, GRShch-2, the side and middle propulsion motor compartment, and other auxiliary compartments are located aft of the APPU compartment. The forward and aft ends of the icebreaker are allotted trimming tanks Nos 1 and 2. The side and bottom compartments are used for tanks for ballast, feed water for the APPU, diesel fuel for its own needs and for supplying other vessels, and liquid cargo; storerooms; etc.

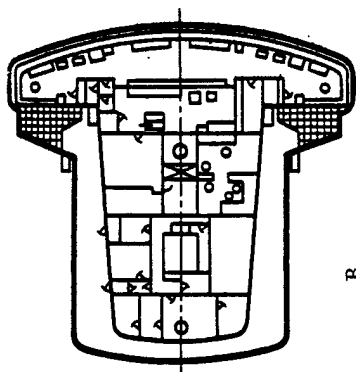
The living quarters in the main hull are located in the bow section; part of the service area and the icebreaker's club are located here. Only service areas and a pool with a set of the necessary rooms are located on the accommodations deck in the section aft of the APPU compartment. The well-developed forecastle and superstructure have basically been allotted for living, public, medical, and other rooms connected with insuring habitability. The central part of the superstructure was used to locate the auxiliary boiler plant, evaporators, posts, and service spaces.

General Lay-out of the Ship
 A- Side view; B-Fourth Bridge;
 C- Third Bridge; D-Forecastle Deck;
 E- Upper Deck

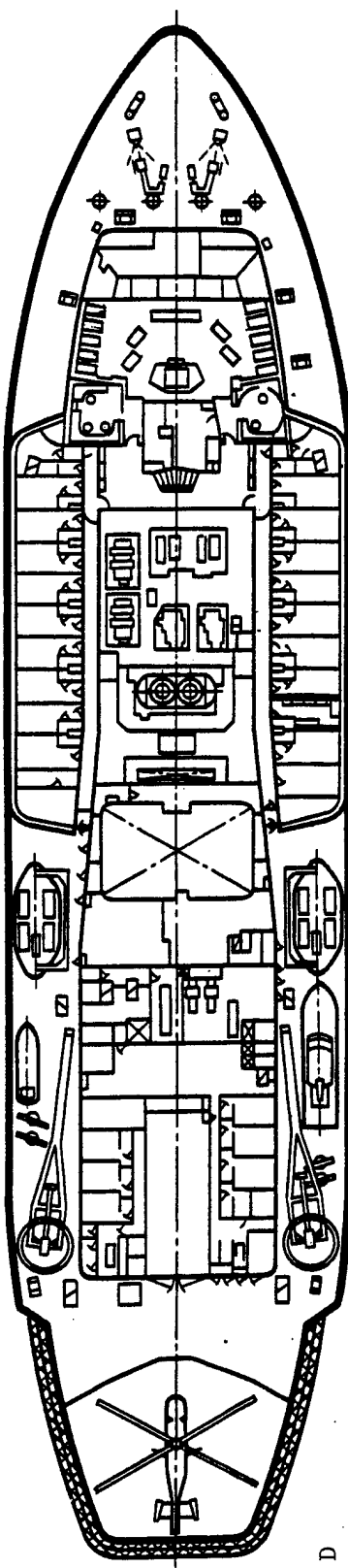




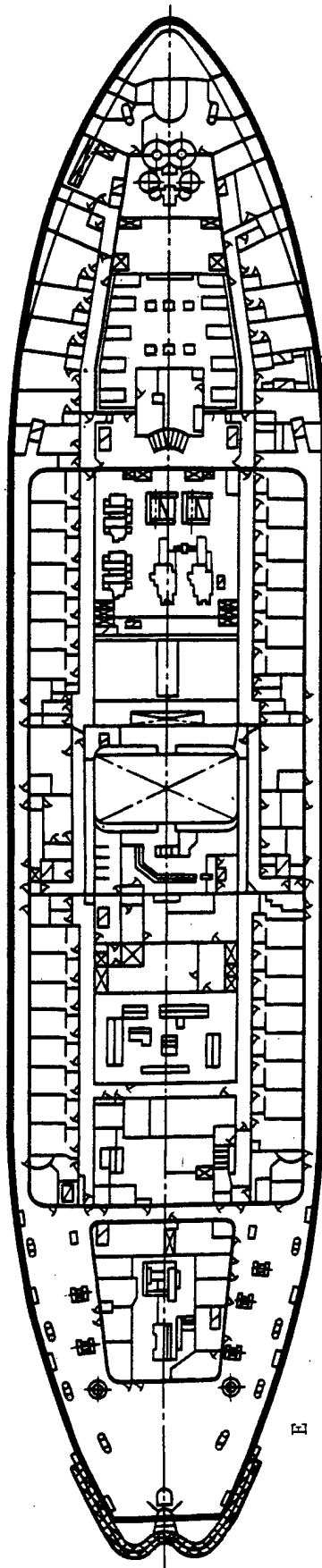
C



B



D



E

Considering the operating conditions, access to all the necessary spaces on the icebreaker was provided for without going onto the open deck. All of the icebreaker's energy plant spaces are connected by a work corridor with a device for transporting mechanisms or their parts to the mechanic's workshop.

The Rossiya icebreaker's resistance to flooding under all operating displacement conditions satisfies the requirements of the USSR Register Rules with the flooding of any two watertight compartments. The icebreaker's hull is divided into eight compartments by the main watertight bulkheads which reach up to the upper deck. In order to increase the icebreaker's survivability, longitudinal watertight bulkheads, which form a second side from the inner bottom to the accommodations deck, have been placed the entire length of the power plant's space. The inner bottom extends from the forepeak to the afterpeak; individual important compartments are found in independent watertight loops. For reasons of insuring radiation safety, the hull was also divided into hermetic loops in the internal planning of the icebreaker.

Firefighting protection is carried out in accordance with the requirements of the USSR Register and is assured by the division of the hull with class A-60 bulkheads into four vertical zones with the isolation of buttoned-up compartments using class A and B structures in each zone; by using nonflammable and fireresistant materials, automatic fire alarm devices and remote controlled fire doors; and by equipping it with a set of firefighting systems (water, chemical extinguishing, foam extinguishing, etc.).

The Rossiya icebreaker possesses good steerability and maneuverability under all travelling conditions, holding steady to the heading. It has an easy motion with a period of 18-20 seconds. Its high ability to travel through the ice is achieved thanks to the selection of an appropriate shape for the hull's lines and to the insuring of the optimum propulsion characteristics and the required strength of the propellers, shaft lines, thrust bearings, and hull.

Propellers made of special high strength steel have been mounted on the Rossiya icebreaker; the propeller shaft and intermediate shaft are forged from alloyed steel with a KT-60 strength category. The sensing of the stop is insured by the single-flange, balance-type slippage thrust bearings which are capable of withstanding dynamic loads of up to 500 tons. Heeling and trim systems, which are controlled from the wheelhouse, exist to increase the vessel's ability to travel through ice and to free itself more effectively when locked in ice.

The icebreaker's hull is made of high-strength steel with a yield limit of 510 megapascals (5,200 kilograms of force per square centimeter) the ice strake has a thickness of 46 millimeters in the bow end, 32 millimeters in the central section and 36 millimeters in the aft end; the thickness of the bottom plates in the central section is 22-26 millimeters. The hull framing system is a transverse one with the main and intermediate frames having an equal contour and mounted every 400 millimeters. The hull has a reinforced design in areas where the ice strain has the greatest effect. Individual hull sub-assemblies have been strengthened with a consideration for the results of operating the Leonid Brezhnev and Sibir icebreakers. The stempost and stern frame as well as the brackets of the propeller shafts were made using castings of O8GDNFL quality-type steel. For protection against corrosion, the icebreaker's

hull is painted with Inerta-160 epoxy paint and -- as a test -- it is planned to mount the Luga-1 type cathode protector with anode units of a reinforced design.

The icebreaker is equipped with ship fittings of the required nomenclature. The anchor device includes two anchors weighing seven tons each, cast and welded chains with a caliber of 72 millimeters and a length of 300 meters, two ShEl2-3 capstans, and other elements. The steering gear consists of the R24 solenoid-operated hydraulic steering engine with a torque of 2,450kN·m, and a simple unbalanced rudder with an area of 17.9 square meters and with a reinforced stock. Towing operations are assured by the LE66 electrically-operated towing winch with a traction force of 322kN. The aft end has a groove which permits the towing of a vessel at an inclination angle from zero to 35° to the stempost.

In order to perform various cargo operations, two KE-32-8 electric cranes with a lifting capacity of three tons each and with a maximum boom reach of 12 meters and three KE39 electric cranes with a lifting capacity of 15 tons each and with a maximum boom reach of 15 meters have been mounted on the icebreaker. Each crane has two control posts.

Four ZPA88 covered motor life boats with spaces for 88 individuals and 12 PSN10M inflatable life rafts have been placed on the icebreaker as survival equipment. Besides this, there are a work and towing launch and a work boat.

Close-in ice reconnaissance, which is performed with the help of a helicopter, has exceptionally important significance for the successful passage of vessels. A set of aviation technical systems (ATS), which supports the basing of a Ka-32 helicopter that is specially equipped for flights under polar night conditions, has been installed on the Rossiya icebreaker. The ATS set includes a landing area 16 meters square; a hangar with a device for transporting the helicopter; a ship helicopter command post; storage areas and distribution systems for fuel, lubricants, compressed air, and nitrogen; an electric power supply system; transfer and communications equipment; illumination equipment; etc.

One of the most important factors, which has a direct influence on the effectiveness of the work of powerful nuclear-powered icebreakers is the level of habitability and the working, living and rest conditions of the crew members. Additional design measures have been implemented on the Rossiya icebreaker in order to raise the level of habitability. Among them are the use of new designs to dampen vibrations in an increased number of cabins; the transfer of part of the cabins and the medical unit from the stern area of the accommodations deck to the superstructure; measures to decrease the noise level from the ventilators, steam valve unit and other mechanisms; expanding the number of improved one-person cabins; organizing the receipt and transmission of television broadcast on the icebreaker to a majority of the cabins, the club and messes; outfitting the Priroda salon, an individual pool complex -- sauna -- in the rest area; etc.

There are 145 cabins with 159 beds, including 11 cabin units, 10 improved single cabins with bath, 36 single cabins with bath, 74 single cabins, 10 double cabins with bath and four double cabins. All cabins have air-conditioning and are equipped with upholstered and semi-upholstered furniture based on new standards, telephones, wash-stands, and other equipment. The public spaces on the Rossiya icebreaker include a wardroom with messes and a pantry, a sailor's mess with a pantry, a club with messes, a sports complex, a swimming pool, a library, a training classroom, an office for social organizations, etc.

The wardroom measuring 112 square meters is located on the forecastle deck and has 58 seats. Two messes immediately adjoin the wardroom: the one for resting and Priroda. The messes are equipped with upholstered furniture and original pictures -- panels, a colored television, a piano, and a stereo receiver; the Priroda mess has open-air cages for birds. The sailor's mess with an area of 128 square meters and 84 seats is located on the upper deck next to the entrance-hall. The club with an area of 110 square meters is intended for 108 individuals. It has a stationary film projector, an equipped stage, and equipment to plug in electric musical instruments. Two rest messes are adjacent to the club, one of which has been set up to watch television broadcasts and the other -- for chess.

The sports complex is located on the upper deck in the aft section of the superstructure and includes a gymnasium with an area of 50 square meters, a sauna, changing rooms, spaces for trainers, showers, etc. Classes on gymnastics, boxing, and game types of sports can be conducted in the gymnasium. The finishing of the housing and public spaces has been carried out with the use of original works of the decorative and applied arts and paintings.

In order to provide medical support to the crew under the conditions of a long separation from shore, a medical unit consisting of a dispensary with a physical therapy and a dental office, an operating room, a sterilizing room, an x-ray room, a laboratory, an infirmary, and an isolation ward, has been set up. Medical support is provided by organic doctors and laboratory technicians.

The food unit complex is designed to store food supplies for a period up to 7.5 months and has completely independent cooling and refrigerating compartments. Equipment for the hydroponic growing of green crops has been installed for the first time on an icebreaker.

The icebreaker's power plant consists of the APPU, the turbo-electric plant with two GTG and three propulsion motors (GED), an electric power plant, two auxiliary boilers, two integrated water distilling plants, two low pressure steam generators, the automated control and monitoring system complex, piping, systems, and auxiliary equipment. Generally speaking, the icebreaker's power plant does not differ fundamentally from the plants on the nuclear-powered icebreakers Leonid Brezhnev and Sibir. The main differences are connected with the replacement of several mechanisms, instruments and devices with new ones that have been mastered by industry during the construction period and also with the numerous improvements made in individual assemblies considering accumulated operating experience.

The power source on the Rossiya icebreaker is the APPU which consists of two units, each of which includes a water-cooled type of reactor with the appropriate auxiliary equipment. Both units work on a common steam main. The unit is located in an air-tight compartment divided vertically into two spaces: equipment and reactor.

The long experience in operating this type of plant on native nuclear-powered icebreakers has confirmed their high reliability and safety in operating. Several design changes, which take the publishing of new norm documents and operating experience into consideration, were introduced into the APPU for the Rossiya icebreaker during its construction.

The fundamental "steam-condensate" cycle circuit arrangement, which had been previously adopted, confirmed the appropriate indicators of economy; and the regenerative steam circuit with the one-stage heating of feed water in the deaerator, which operates on steam from the turbo-pumps, has been kept for the Rossiya icebreaker.

Two turbo-generators with a capacity of 27.5 megawatts (37,500 horsepower) each; turbo-feed, turbo-circulating and electric condensating pumps; and several auxiliary mechanisms and units with the required systems and pipes, are included in the main steam-turbine plant.

The main turbo-generator has been built as a non-reduction assembly with the TG-642 main turbine and three alternating current generators located consecutively along one axis, which have been mounted on a common base. The GTG turbine has a single case and two channels with throttle governing, one impulse radial stage and 15 reaction stages in each channel. The turbine's nominal power is 27.5 megawatts (37,500 horsepower) with a rotational speed of 3,500 revolutions per minute. The main condenser is a two-pass one with double tube plates and a built-in throttle humidifier. The GTG oil system is a gravitational one with four (two of them are reserve ones) electric oil pumps supplying 105 tons per hour each, two MOD-65/80 oil coolers supplying 130 tons per hour each, two oil filters, lubricating oil reserve tanks with a capacity of 90 tons, and other equipment. If the pumps break down, the system provides for the emergency lubrication of the GTG for five minutes.

The circulating and cooling system of the outside water satisfies all the using equipment in the power plant and includes specially designed ice compartments, three TTsN 6800/12.8 propeller type turbo-pumps supplying 6,800 tons per hour each, eight NTsV-630/15A-P electric pumps supplying 630 tons per hour, three TsVS-10/40 pumps supplying 10 tons per hour each, coolers, mechanical and ion exchanger filters, a system for automatically regulating the temperature of the outside water in the ice compartments before supplying it to the main and auxiliary condensers, and other necessary equipment. Control of the technical gear in the system is accomplished by remote control from the TsPU.

The condenser feeder system was built using a closed circuit with deoxygenation of the feed water in the condensers and deaerator and the demineralization of it in the ion exchanger filter. Four EKN-300-100R electric condensate pumps

(with provisions for the automatic actuation of the reserve ones) supplying 300 tons per hour, six FI 125/1400-2 ion filters supplying 120 tons per hour, four mechanical double filters, a DSTM 2400 x 2 thermomechanical deaerator, four main feed turbo-pumps, two reserve feed electric pumps, two emergency feed electric pumps, tanks for the feed-water reserve, and other required equipment have been installed in the system. Control of the technical systems is automatically and by remote control from the TsPU.

The main steamline on the icebreaker is a two-connector one with the main lines located along the sides and with a bulkhead in the GTG compartment. Steam is supplied to the turbines through quick-acting shut-off and control valves in the steam valve unit (BPK). There is a system for releasing steam in the main condenser in order to maintain constant pressure before the BPK. The steam valve unit of the maneuvering gear has been substantially modernized in order to decrease the noise level when releasing steam. Compensation for thermal expansion is provided for by plane and spatial compensators made of smooth piping. The control and monitoring of the operating and the signalling system for the condition of the steam turbine assembly are carried out on a panel located in the TsPU.

The propulsion power plant (GEU) of the Rossiya nuclear-powered icebreaker has been constructed based on an alternating-direct current. The GEU includes six main generators (three for each turbine), six silicone rectifier assemblies, three double-armature direct-current propulsion motors, six nonreversible thyristor exciter generators, three electric propulsion panels, an electric propulsion console, and three remote control posts.

The generator set consists of three synchronized main generators (GG) of the TK-9-4 alternating-current type that are connected with each other; the power of each generator is nine megawatts, the voltage is 780 volts, and the frequency is 116.7 hertz with a rotational speed of 3,500 revolutions per minute. The generators have separate excitation (VAKS-150-330 static exciters) and self-ventilation in the closed cycle. Each generator operates on its own VUKEP 9000-1000 type power rectifier that has been assembled using silicone valves.

Three double-armature GED of the type 2MPS17600-1300M3 with a power rating of 2 x 8.8 megawatts with a voltage of 1000 volts and a rotational speed of 130 revolutions per minute have been installed for the propeller drive. Each GED has commutating poles, separate excitation windings and compensating windings; cooling is by built-in open-cycle electric fans. Six VAKSR-150-330 reversible static exciters, which have been assembled using a three-phase propulsion circuit on the thyristors, have been installed in order to power the GED excitation windings. Control of the propulsion motor is carried out through remote control action on the static exciters of the GG and the GED through power reference-input elements with the help of the handles on the engine-room telegraphs of the ship-handling console. The electric propulsion system automatically insures the maintenance of the assigned power level of the generators within the range of measurement of the propellers' characteristics in the power reference-input elements' positions from 10 to 20 and the maintenance of speed constancy in positions from one to nine.

A copper ShPV8 bus duct, which is laid through special electrical cable passages, is used to connect the rectifier devices and propulsion motors with the electrical propulsion panels. The main GEU control, measuring and signaling instruments are concentrated on the electrical propulsion console, which has been installed in the TsPU.

The icebreaker's electric power station consists of five auxiliary turbo-generators (VTG), an automatic stand-by diesel generator and two emergency diesel generators. An auxiliary turbo-generator is a non-reduction three-support unit which consists of an impulse-type turbine with nozzle regulation, a two-pass condenser with double tube plates, and a TK-2-2 generator with a capacity of two megavolts and a voltage of 400 volts with a self-excitation and air cooling system.

The stand-by diesel generator (RDG) of the 1D100A type with a rating of one megavolt is permanently ready to start and provide the necessary electrical power to the using equipment in the absence or sudden halt in the supply of steam to the VTG. Emergency diesel generators (ADG) of the ADGF 200/1500 type with a rating of 200 kilovolts each provide for the supplying of electrical energy to the most critical using equipment under emergency conditions. The make-up, placement and circuit solutions insure dependability in providing electrical energy to the using equipment.

Control and monitoring of the operation of the auxiliary electrical power plant are carried out by a remote automatic control system which provides for the accurate synchronization of the VTG and RDG with the GRShch panels, sections or GRSh between themselves and with the shore network; the issuing of the signal to start the RDG and ADG upon signals of a fault in the emergency shielding of the APPU reactors and to unload the VTG; the monitoring of the insulation resistance on the GRShch panels; the remote distribution of loads between the VTG; the remote control of the generators and section and feeder circuit breakers with the light signals for their position; and other functions. The mentioned system permits the operational control of the entire electric power plant (together with the GEU) to be carried out by the watch electro-mechanic from the TsPU.

Two KVVA-12/28M auxiliary water-tube steam boilers with a steam-generating capacity of 12 tons per hour have been installed to provide the icebreaker with steam when the APPU is not working. Two M4S-1 automatic integrated fresh water distilling plants with a capacity of 120 tons a day each have been provided to replace leaks of APPU feed water and to prepare incoming water for the everyday needs on the icebreaker. The plants work on the self-evaporation principle which provides for a chlorine ion content of no less than 0.1 milligrams per liter in the distillate. Two PGND-5.5/5 automatic low pressure steam generators with a capacity of 5.5 tons per hour with a generated steam pressure of 500 kilopascals (five kilograms of force per square centimeter) provide for the obtaining of saturated steam for the heating systems, practical needs and other uses.

The complex of automatic equipment systems, which have been installed on the icebreaker, insures remote automated control of the main and auxiliary mechanisms, pumps and accessories; automatic regulating of the processes that are occurring in the power plant, including during emergency situations; the collection, processing and picturing of information on control consoles in digital form and on pointer instruments for the operation of the power plant and its systems, and the display of warning, emergency and operating signals on the consoles. The complex of automatic equipment systems was created using a modern element base and has a sufficient degree of reliability and maintainability.

The TsPU is the center for the collection of information and for the control of the technical systems in the power plant on the icebreaker. Consoles for the steam-generating, steam turbine, propulsion electric power, and electrical power plants and for radiation monitoring and other required panels and instruments have been installed in it. Control of the power plant is carried out by operators without performing constant watch in the machinery compartments, near the GRShch and in other places.

Radiation monitoring on the icebreaker is accomplished by a set of equipment which consists of stationery devices with a console in the TsPU and portable and laboratory instruments. A check of the effectiveness of biological protection has shown that the actual levels of gamma and neutron radiation -- when the reactors are at 100 percent power -- do not exceed the regulated values anywhere. As a result of comprehensive tests it has been established that the complex of designs which has been implemented on the Rossiya icebreaker, the technical systems which have been installed, and the volume of radiation monitoring which has been accepted insure dependable technological monitoring of the operation of the APPU and the complete radiation safety of personnel.

The Rossiya icebreaker is equipped with all of the ship systems that are required for its normal operation -- a firefighting water system, steam smothering, chemical smothering, foam smothering, trimming, listing, water pumping, dehumidifying, ballast, etc. Water is supplied automatically to the firefighting system by three NTsV-160/80A-P pumps supplying 160 cubic meters per hour. The system is also remotely controlled from the TsPU. The extinguishing of a fire using steam with a pressure of 500 kilopascals (5 kilograms of force per square centimeter) is intended for the fuel tanks, RDG and ADG mufflers, the paint store, and the chimney of the boiler. A space extinguishing system embraces all of the main spaces of the power plant and the electrical distribution boards, the helicopter hangar, etc. Three stations, which are equipped with tanks having BF-2 fire-dampening liquid, cylinders with compressed air, and the necessary equipment and instruments have been placed on the icebreaker. The SO-IV stationary sets, which have been installed in the main compartments of the power plant, are used in the foam extinguishing system.

The trimming system uses an open loop and includes a forward and an aft trimming tank with capacities of 1,100 and 1,060 tons respectively. The

taking in and pumping out of water in each of the tanks is accomplished by means of two forward and two aft propeller reversible ESN-13/P electric pumps supplying 4,100 cubic meters per hour; the time to fill and clear each tank is approximately eight minutes.

The listing system consists of tanks located along the sides with a capacity of 570 tons and two transfer channels with two reversible propeller ESN-13/11 electric pumps supplying 4,100 cubic meters per hour. The listing system is equipped with automatic controls in the rocking-from-side-to-side mode. This allows it to be used under travelling conditions in order to increase its ability to travel through the ice. The time for pumping water from one side to the other in one direction is approximately five minutes. The trimming and listing systems are remotely controlled from the pilot house and the TsPU.

The water pumping system is serviced by two NTsV-630/15 submersible electric pumps supplying 630 tons per hour that have been installed in special water-proof enclosures. The ballast system includes nine ballast tanks with a total capacity of approximately 1,200 tons and is serviced by two NTsVS-160/30A electric pumps supplying 160 cubic meters per hour each. The control of the ballast system is carried out remotely from the TsPU.

The machine ventilation of the icebreaker's compartments and power plant spaces is accomplished using a combined schema: artificial forced-in and exhausted ventilation; natural exhaust ventilation; the use of air conditioners and axial and centrifugal electrical fans; with partial recirculation and without it; and with the use of filters for coarse and fine cleaning. The design parameters of the machine ventilation systems satisfy the requirements in operating the icebreaker under the different conditions of the Arctic Basin.

Considering the protracted separation of the icebreaker from its shore base points and the need to maintain all technical systems constantly in working order, well equipped mechanical, electrical engineering, welding, and electro-navigational workshops; a strong current laboratory; a workshop and laboratory to repair and inspect control and measuring equipment; and a section for inspecting radiation monitoring equipment have been outfitted on the icebreaker.

The continuous operation of icebreakers in the areas of the Arctic Basin under complicated meteorological conditions places increased requirements on the make-up of navigational equipment and external communications systems. In order to assure navigation safety and to develop and display navigational parameters, a navigation complex, which consists of an arctic version of the gyrocourse indicator with two central instruments, a magnetic compass and radio-doppler and induction logs; receiver displays of the various systems; a radio direction finder; an information and control complex; and other equipment, has been installed on the Rossiya icebreaker. A ship-handling complex and recording equipment has been installed to solve ship-handling operations. Measurement of depths up to 200 meters is provided by an acoustic depth finder with antennas of increased strength which are capable of withstanding the ice load.

Two radar stations, an automated collision warning indicator and two receiver displays have been installed on the icebreaker in order to assure navigation on the open seas, close to shore, in narrow passages, and through channels under conditions of poor visibility, and collision warnings.

Special equipment, which permits the matching of the icefield's condition with the navigational chart, receives and processes information from ice reconnaissance aircraft. The navigation equipment set is located in the wheel house and navigation room and in the post, control rooms and power rooms located near them.

Two radio transmitting centers, a radio room, and a radio communications control room with the necessary auxiliary compartments have been set up on the Rossiya icebreaker in order to communicate with vessels, bases and aircraft. Two shortwave and medium high-frequency wave and two medium wave radio transmitters, 10 radio receivers, shortwave receiver transmitters, a satellite communications radio station, emergency radio stations, a radio buoy, and other radio equipment have been installed in them.

The icebreaker can receive television broadcasts through satellites with subsequent rebroadcasting to the vessels in the convoy using the collective receiving station; it can also receive colored and black and white programs from shore television stations and subsequently broadcast them to the living and public spaces.

The new nuclear-powered icebreaker has begun its working life. Ahead of it lies complicated work on the northern sea routes to insure the shipment of national economic freight. The hull of a new icebreaker of this same type is growing on the ways of the Baltic yard.

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INTERSECTOR NETWORK DEVELOPMENT

TRANSSIBERIAN CONTAINER SERVICE DEVELOPMENT, ACTIVITIES

Moscow MORSKOY FLOT in Russian No 6, Jun 86 pp 38-39

[Article by S. Makeyev: "Transsiberian Container Service"]

[Text] The Transsiberian Container Service (TSKS) today is the shortest route for supplying transit goods in large containers from Japan to the countries of Western Europe and back again.

The TSKS consists of several sections. The container is loaded on the ship at the Japanese port and is delivered to an eastern port. There it is transferred to the railroad and is delivered to the western border of the USSR along the Transsiberian mainline. Then the container either continues on to the consignee by rail (the so-called "Transrail" system) or is transferred to a soviet container ship, which transports it to one of the European ports ("Transsea" system). Also operating within the TSKS framework is the "Sea-Air" system of shipping transit containers. Here the container, having arrived at an eastern port, is sent to the Vladivostok Airport, where it is loaded onto an Aeroflot plane (the line is now served by type IL-76 airplanes, which hold three 20-foot containers each) and is shipped by air to the Luxembourg Airport, where the consignee picks it up.

This route constitutes a total of 13,000 kilometers (as against 20,000 kilometers when containers are shipped by sea through the Suez or the Panama Canal). Overall transit time of container delivery by TSKS "door-to-door" using the "Transrail" or "Transsea" system is not over 35 days, and by the "Sea-Air" system--10 days.

Working out the problems connected with the formation of TSKS was begun as early as 1965. At that time the Japanese Gyro firm sent ten 20-foot containers in transit through USSR territory to France. The trial shipments were made when there were no container ships and the containers were loaded onto the decks of passing dry cargo ships and secured with ropes. Not only were there no specialized terminals at the ports, there were not even areas with a paved surface to store the containers. There was no materials handling equipment. The situation was no better at the railroad. There were neither well-equipped complexes nor special platforms. The consignees received the first container batches in from two to three months. Test shipments, however, still showed not only the

potential, but also sufficient efficiency. In all, during the period from 1967 to 1970, only 511 containers were shipped (here and from now on, containers are equivalent to 20 feet).

In September 1970, discussions were held in Moscow by representatives of the Ministry of the Maritime Fleet, the Ministry of Railroads, the Ministry of Foreign Trade and the State Railways of Japan concerning the possibility of organizing container cargo shipping between Europe and Japan in transit through the territory of the USSR.

On 30 March 1971 the motorship Kavalerovo--the first vessel of the Far Eastern Shipping Company, fitted out to transport 56 containers--left the Port of Osaka. There were eight transit containers on board it. This date is officially regarded as the start of operations of the TSKS.

The first containers from Europe to Japan were shipped from the Port of Nakhodka on 17 May 1971. At this time the motorship Grodekovo was modernized, and its holds were equipped with compartments for 100 containers. On 1 July 1971 this vessel went on the Japanese line, and became the first domestic container vehicle of the cellular type. The line was named the TSKL [Trans-siberian Container Line].

The operation of two vessels to the ports of Kobi, Yokohama and Osaka, on a strict schedule, regulated transit shipping from Japan, the cargo flow began to grow rapidly, and in May 1972 it constituted 1000 containers. In August of the same year, 1680 of them had already been shipped. Since that time the number of containers shipped by TSKL has stabilized.

The growing popularity of TSKS led at the beginning of 1972 to the formation of a second branch of TSKL--to Hong Kong. In April 1972 the motorship Kavalerovo commenced the operation of the new branch. On the first voyage from Hong Kong the vessel carried only two containers.

TSKS services are hastening to make use of Philippine consigners as well. In February 1975, with the departure of the Kavalerovo from Nakhodka to Manila, the third branch of TSKL was opened. Later, at the end of 1980, the Philippine branch, and at the end of 1984 the Hong Kong branch were included in the complement of the Fesko Australia Line.

Despite the popularity of TSKS, some of the consigners still held back from the "Siberian bridge" services. This was because of their lack of information on the procedure for processing containers at Soviet ports and at the border railroad stations and on the rolling stock and routes of the goods through the territory of our country. However, the tremendous interest of Japanese business circles in possibly greater use of the advantages afforded by TSKS led to the fact that in spring 1973 a delegation from the Japanese Association of Exporters of Industrial Goods went to the USSR and were faced with the task of familiarizing themselves in detail with the work of TSKS. Particular attention was directed to the vibration of the railroad cars and the effect of frosts on the "sensitive" Japanese export (measuring instruments, transistor radios and tape recorders).

The response of the delegation was published in the newspaper SHIPPING AND TRADE NEWS. It confirmed the fact that, having visited the ports of Nakhodka, Leningrad and Zhdanov and the railroad stations, and having become familiar with the work of TSKS, the delegation came to the conclusion that there was no justification for any apprehensions concerning the safety of the cargo. In particular, the account stated that the effect of vibration during shipment by rail does not exceed the effect of the rolling motion during sea transport and that during the time that TSKS has been in existence there has been not a single claim connected with damage to the cargo due to low temperatures.

Many Japanese and European consigners became acquainted with the report, and later changed their negative attitude toward TSKS. As a result, the shipment volumes sharply increased. While in 1972, 16,565 transit containers were shipped, in 1973 this figure almost doubled. In 1976 117,940 containers had already passed through TSKS.

As has already been noted, the first vessels placed on TSKL in 1971 were the motorships Kavalerovo and Grodekovo. In 1971-1972, vessels of the Belomorskles and Petrozavodsk type, converted to transport supersize containers, began to operate on the lines. In 1973, three new domestic container ships of the Sestroretsk type came to TSKL. In the same year the Far Eastern Shipping Company obtained a specialized vessel of the Aleksandr Fadeyev type. In 1974 the fleet of this shipping company was augmented by two more such vessels. All the specialized container ships were delivered to TSKL and rapidly gained recognitions from consigners. In connection, however, with the rapid growth of the proportion of 40-foot and "high containers" (8.5-9.0 ft) and the simultaneous increase in the shipment volumes, the shipping company was obliged to see to reequipping the fleet. The capacity of vessels of the Sestroretsk type was increased from 218 to 302 containers, and of the Aleksandr Fadeyev type, from 304 to 400. A single lengthwise row of containers was added on the deck and the coamings of the hatches on vessels of the Aleksandr Fadeyev type were raised by 60 cm, which made it possible to load containers 8.5 and 9 feet high in four tiers into the holds. Subsequently the TSKL fleet was augmented with vessels of the Pula type, specially reequipped into cellular container carriers, the capacity of each of them being 702 containers. Today TSKL is served by three motorships of this type and one of the Aleksandr Fadeyev type, as well as four Japanese vessels with a general capacity of 1690 containers.

The shore base was also developed. On 26 December 1973 the first container terminal in our country, estimated for processing 45,000 containers a year, was put into operation at Nakhodka (Cape Astafyeva). In May 1976 a container terminal was put into operation at the Port of Vostochnyy, the planned capacity of which was 70,000 containers a year. Later, both terminals increased their capacity: the first--to 55,000 and the second--to 140,000. In the 11th Five-Year Plan, when the ASU [automated control system] for the Port of Vostochnyy was put into operation, its throughput capacity increased 1.5-fold.

Measures have also been taken for railroad transport. The Ministry of Railroads acquired special platforms for transfer of large-tonnage containers and put more powerful locomotives into operation.

All these measures, including the automated system of transmitting mutual information on the movement of transit containers, as well as a flexible freightage policy carried out by the Soyuztranzit All-Union Association, made it possible for the "Siberian bridge" to offer the clientele high-quality transport services, to raise the international prestige of TSKS and to draw additional cargo volumes to shipping. In 1981, 150,724 containers were shipped.

The increase in shipments led to the fact that in the world market of transport-dispatch services TSKS began to encounter stiff competition on the part of capitalist shipping and dispatching companies.

The main competitor of TSKS is the Far Eastern Freight Conference (DFK) which, until TSKS was founded, had the monopoly on shipping transit containers between Europe and the Far East. DFK was formed in 1875 and was the first monopolistic association in shipping. DFK is a "closed" conference, and its admittance of new members is strongly restricted. The DFK sphere of influence encompasses Europe and the Far East, and the majority of its members are companies of "traditional sea powers." There can be no doubt of the loyalty of the clientele to DFK. In addition to DFK, TSKS has other, no less powerful competitors, such as the Sealand, Yang Min, Evergreen and other companies. Since the second half of the 1970's, DFK has begun carrying out a number of measures directed toward reducing the freight flow bound for TSKS. It has created three special subdivisions in its structure: the "Fighting Committee," the "Rating Committee" and the "Special Rate Quotation Committee." Their activity is directed toward producing recommendations and practical measures which have as their end goal ensuring, by any means, the lion's share of transit containers to be shipped by their own vessels. Since 1977, DFK has begun to make wide use of such methods of competitive fighting as granting discounts of up to 40 percent of the official tariff, and in a deal with its clients it secretly reduces tariffs for cargoes shipped and organizes delivery from Europe to the Far East of empty containers at considerably reduced rates or--completely free.

Under the conditions of such fierce competition, and due to the effect of a number of events taking place in the world (wars, development or breakdown of trade relations between countries, a drop in the exchange rates of national currencies, etc.), the shipment volumes within the framework of TSKS fluctuate somewhat. While in 1983, 128,861 containers passed along the mainline, in 1985 the number was 99,214.

Under these circumstances, in order to uphold the prestige of TSKS in the world market, the quality of the services must constantly rise, and the service improve. For this purpose, the Ministry of the Maritime Fleet, the Ministry of Railroads and the Soyuztranzit All-Union Association have worked out and introduced new forms of transit container shipment--block trains. These trains are made up of 50 special platforms, on each of which are placed two or three containers destined for one or two points (there are about 14 of these points in all, including 5 maritime ports and Jolfa and Astara in Iran and Termez and Kushka in Afghanistan).

Today all transit containers in the western direction and most of them in the eastern direction are by block trains. A number of other measures have also been introduced which make it possible to offer the client a broader range of transport services.

Further development and improvement in TSKS service will make it possible to reinforce even further the international authority of the "Siberian bridge" and to attract additional volumes of containerized cargoes for shipment.

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INTERSECTOR NETWORK DEVELOPMENT

PLANS FOR ROAD, RAIL CONSTRUCTION IN AZERBAIJAN

[Editorial Report] Baku KOMMUNIST AZERBAYDZHANA in Russian No 7, July 1986 carries on pages 59-62 an article by E. Sadykhov and K. Tagiyev which is devoted to plans for the development of the transportation network in the AzSSR.

More than 3,600 kilometers of hard-surfaced roads were built in Azerbaijan during the 11th Five-Year Plan. There are plans for work on another 3,300 kilometers of roads, including improvements on the Rostov-Baku-Astara, Baku-Tbilisi and Alyat-Dzhulfa highways.

With the Yevlakh-Belokany rail line now operational, plans for railroad construction in Azerbaijan now include 80 kilometers of double-tracking, and electrification of the Norashen-Dzhulfa and Mingeaur Glavnaya-Mingeaur Gorod rail lines.

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END